WILL COUNTY SOILS

SOIL REPORT 80

UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION

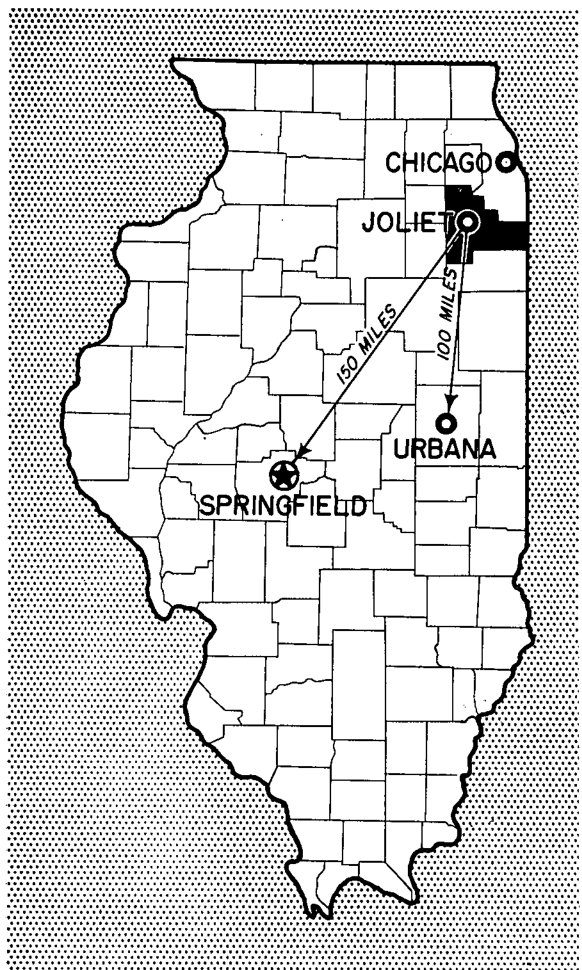
In cooperation with SOIL CONSERVATION SERVICE, U. S. Department of Agriculture

COVER PICTURE

The picture on the cover is an aerial view of a portion of Will county as it appeared in 1954. The town of Plainfield appears in the lower part of the photograph, with parts of two gravel pits showing just to the southeast and northeast of town. Du Page river, flowing diagonally from northeast to southwest, passes just west of Plainfield, and paved highways radiate from town in several directions.

Symerton silt loam and Elliott silt loam occupy most of the area shown in the northwestern part of the photograph. Saybrook silt loam, Lisbon silt loam, and Drummer silty clay loam occupy most of the remaining area west of Du Page river. The bottomland soil along Du Page river was named Du Page silt loam. The steep gravelly slopes are Rodman gravelly loam, while the nearly level uplands along Du Page river and to the east are primarily Warsaw silt loam and Troxel silt loam.

(Picture supplied by U. S. Department of Agriculture.)



Will county is in northeastern Illinois. Joliet, the county seat, is about 25 miles from Chicago, 150 miles from Springfield, and 100 miles from Urbana, the location of the University of Illinois.

CONTENTS

Authors: H. L. WASCHER, Associate Professor of Pedology; P. T. VEALE, formerly Assistant Professor of Soil Physics; and R. T. ODELL, Professor of Pedology, all in the Department of Agronomy.

The authors are indebted to A. L. Lang, L. B. Miller, C. A. Gholson, and D. L. Mulvaney, University of Illinois experiment fields, for the data in Tables 31 and 32; and to J. D. Alexander for many of the figures. Field mapping, soil correlations, and laboratory studies were conducted by personnel of the University of Illinois Agricultural Experiment Station in cooperation with the U. S. Department of Agriculture.

Urbana, Illinois December, 1962

WILL COUNTY SOILS

H. L. WASCHER, P. T. VEALE, and R. T. ODELL

THIS SOIL REPORT has been prepared to help answer the following questions: What soils occur in Will county and where are they located? What are their characteristics and how may they be classified? What are the yields of some common crops? What are some of the natural and cultural features of the county that may be important not only to its agricultural development but also to its urban and industrial development?

The report is concerned primarily with soil characteristics that undergo little or no measurable change from natural causes during a period of perhaps 50 to 100 years. Thus the facts gained from past experience and experimentation may be used in classifying the soils, determining their best uses, and predicting their productivity under different systems of management.

Specific management suggestions are not included in this report. Instead, a separate soil management folder or guide is available to the farmers and land owners in Will county. It is entitled, "How to Know Your Soils and Manage Them Wisely, A Personal Guide for Every Farmer in Will County, Illinois" (*13*).[1,2] This guide may be revised from time to time as new management facts become known and new farming techniques are developed. It is designed to give the farmer up-to-date, specific management suggestions for his own farm. It includes a large-scale soil map of the individual farm with aerial photographic background. Such a map is especially useful in planning soil and water conservation measures on the farm.

A soil map of the entire county, printed in color, is in the pocket at the back of this report. It shows the location and extent of the various soil types in the county. The total area of each soil type is given in Table 5.

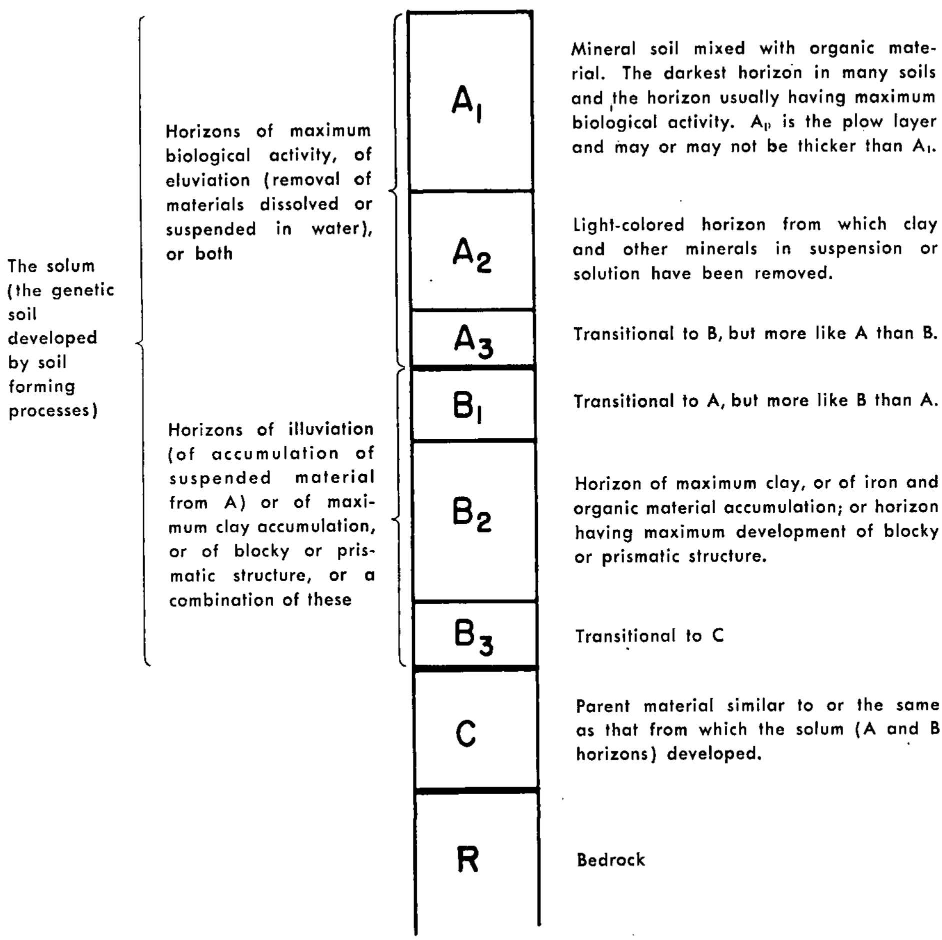
[1] Italicized numbers in parenthesis refer to literature cited on page 105.
[2] The Will County soil management guide is available through the offices of either the Will county farm adviser or the Will County Soil Conservation District.

Dairying is important in Will county, and scenes like this are common. (Fig. 1)

HOW TO USE THE SOIL REPORT AND SOIL MAP

Characteristics of the soils. In studying soil types and soil type descriptions it is important to note that soils are usually separated on the basis of their characteristics to depths of 3 or more feet, not on the plowed layer or surface few inches alone. Two soil types with similar surfaces or topsoil layers may have such different subsoil or substratum layers that they vary widely in many specific uses and in agricultural value.

All soils in Will county, other than those of recent overflow bottomlands, are made up of several layers or horizons which lie approximately parallel to the earth's surface. These soil horizons were formed in place through weathering of earth materials known as parent materials. A vertical section of a soil through all its horizons, extending into the unweathered parent material below and including any other underlying material that is significant to the use or management of the soil or to plant growth, is known as a soil profile. That portion of the soil profile in which the



Principal horizons of upland soils. Not every horizon and subhorizon shown here, however, is necessarily present in all soils. (Adapted from *Nomenclature of soil horizons*, U. S. Dept. Agr. Handbook 18, pp. 174-183. 1951.) (Fig. 2)

processes of soil formation are primarily taking place (A and B horizons) is called the solum.

Figure 2 is an idealized profile sketch showing all the principal horizons that may occur in the soils of this region. Some of the horizons and subhorizons shown in this sketch may be missing from many of the soil types in Will county. Usually one subdivision of the A horizon and sometimes one or more subdivisions of the B horizon are missing, particularly in the dark-colored soils.

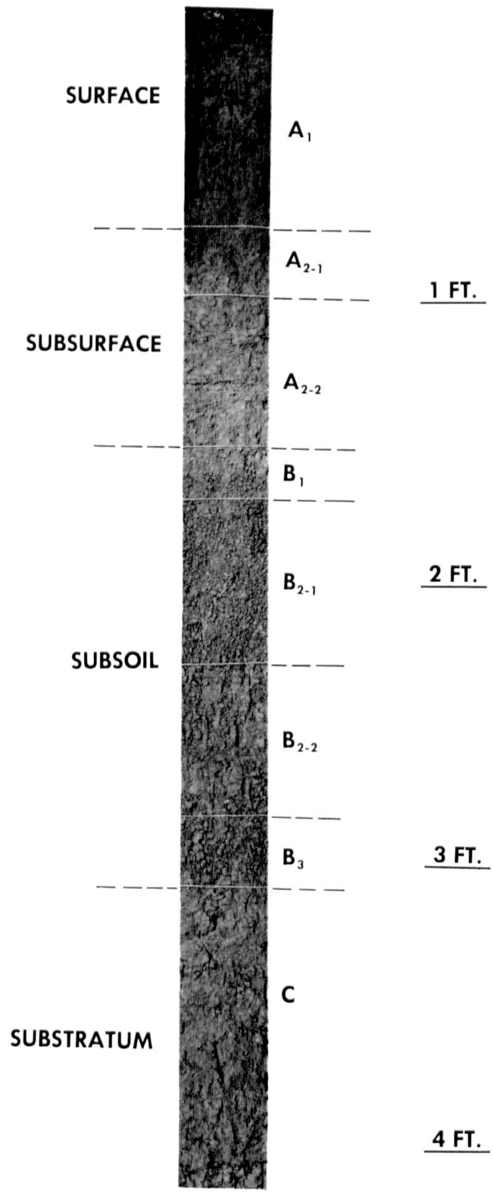
Most Will county soils have portions of three major horizons — A, B, and either C or R. A few have all four horizons, while others have only two — A plus either C or R. Some soils, particularly in the bottomlands, have only an A horizon to a depth significant for plant growth.

A profile of a well-known soil in Will county with most of the major horizons and some subhorizons is shown in Figure 3. The horizons are indicated by the general terms commonly used — surface, subsurface, subsoil, and substratum — as well as by the letter designations.

The soil map. The soil map of Will county consists of three sheets — northwest, southwest, and southeast. The part of the county covered by each sheet is shown on the back of the sheet.

General soil conditions are indicated by broad color groupings on the map. Various shades of yellow and light tan are used for the light-colored soils that developed under forest vegetation but have variable permeability. Shades of blue are used primarily for dark-colored soils of moderate permeability; brown for dark-colored soils of moderately slow permeability; and dark gray and dark tan primarily for soils of slow permeability. All soils of the latter three groups were developed in calcareous glacial till under tall-grass prairie vegetation.

Mixed colors of green and blue indicate dark soils of moderate permeability developed in water-deposited sediments of medium to moderately fine texture. Mixed pink and purple colors indicate mostly shallow, dark soils on gravel. Mixed colors of brown, yellow, and green



This profile of Millbrook silt loam shows the major soil horizons as well as a few subhorizons. General horizon terms are given at left and technical letter designations at right. (Fig. 3)

show areas of sandy-textured soils. Uncolored areas are those in which the natural soil has been so thoroughly mixed, covered, or destroyed that no soil type could be identified.

Within the broad color groupings, each soil type is shown by a distinctive color and number. The same color and number are used for all areas of a given soil type, except that a letter is used instead of a number in areas too small to accommodate a two- or three-digit number. The various soil type names, numbers, and letters, as well as other map symbols, are given in the legend on each map sheet.

In housing developmental areas and in most of the towns, including Joliet, soil types were identified by examination in vacant lots, and the soil lines were drawn by following topography.

During the field mapping, many soil type areas were further subdivided into smaller units because of differences in slope and thickness of the surface and subsurface, or A horizon (Fig. 2). As these features are of limited importance in characterizing and classifying soil types, they are neither shown on the colored map nor discussed in this report. They are very important to the productivity and proper management of the individual soil units, however, and are retained on the map supplied to the farmer in his management folder (*13*).

To help find a particular tract of land many cultural features such as towns, railroads, paved highways, country roads, and farm houses are indicated. Section boundaries, section numbers, township and range numbers, and streams are also shown.

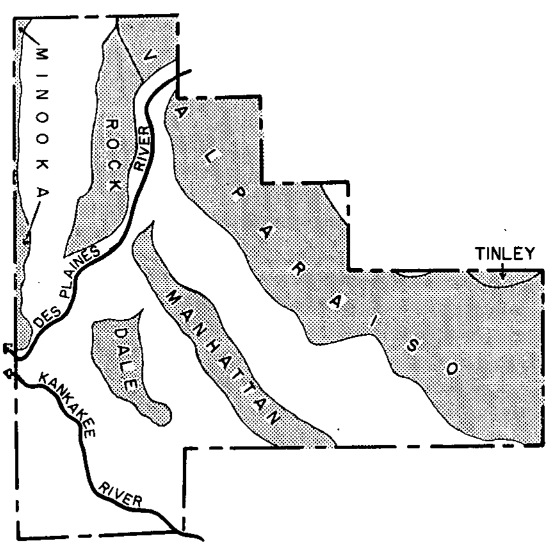
NATURAL FEATURES OF WILL COUNTY

Location and size of county. Will county is located in northeastern Illinois. It has an area of 845 square miles. Joliet, the county seat, is a few miles northwest of the center of the county.

Physiography. The topography in Will county varies from depressional and nearly level to rolling, with a few steep slopes along some of the streams. Five morainal ridges (Fig. 4) along with several outwash plains and intermorainal areas, contribute to these topographic differences. In the southwestern part of the county, some sand is piled up into dune-like ridges.

The morainal ridges were deposited by the last several glaciers to enter the area that is now Will county (Fig. 5). Meltwaters from these and other ice sheets were responsible for the large, nearly level outwash plains next to the Du Page, Des Plaines, and Kankakee rivers.

Minooka moraine forms a north-south ridge along the Will-Kendall county border (*6*). It does not extend south of Des Plaines river. Rockdale moraine begins in northern Will county, where it



Glacial moraines are important topographic features in Will county. They are normally more rolling than the intermorainal areas and outwash plains. (Fig. 4)

emerges from under the Valparaiso moraine and extends southward between Du Page and Des Plaines rivers. Three small valleys, formerly glacial drainage-

Plateau glacier in Alaska, photographed from about a mile away. It is about a mile wide and stands 200 feet above the water. This glacier is much smaller than those that in past ages pushed into the area that is now Will county. ***Courtesy Robert L. Jones.*** **(Fig. 5)**

ways, are traceable through the Rockdale moraine. A wide break occurs at Des Plaines valley but south of this valley the moraine extends south to Elwood and southeast to about Symerton.

Manhattan moraine begins just south of Joliet and extends in a southeasterly direction into Kankakee county. It is broken in several places by small valleys of streams arising in the Valparaiso moraine to the northeast.

The Valparaiso, a very broad moraine, is the largest of the morainal ridges in Will county, covering most of the northeastern part of the county. It extends into Du Page and Cook counties on the north and eastward into Indiana. A fairly prominent front occurs along much of its outer margin. In the past this moraine formed a drainage divide between the Illinois-Mississippi river systems and the St. Lawrence river system. Tinley moraine touches the extreme northeast corner of Will county at Steger.

The lowest elevations in Will county are about 500 feet above sea level and are in the area where the Des Plaines and Kankakee rivers leave the county. The highest elevation, about 830 feet above sea level, is on the Valparaiso moraine just west of Monee. Other elevations are Beecher, 720 feet; Frankfort, 760 feet; Manhattan, 690 feet; Plainfield, 610 feet; and Wilmington, 550 feet.[1]

Drainage. Probably all drainage waters in Will county now find their way to Illinois river through the Du Page, Des Plaines, and Kankakee rivers. The waters from Plum creek and other north-flowing streams formerly flowed into Lake Michigan and thence to the St. Lawrence river, but after construction of the Chicago Sanitary and Ship Canal and opening of the Calumet Sag Channel these waters were mostly diverted to Illinois river.

In general, most soil areas with slopes greater than 2 to 3 percent are well enough drained to be farmed efficiently. Many areas with less than 2 to 3 percent slope and most depressions need drainage. Some soils and soil materials are rapidly permeable and are well drained where the water table is deep, regardless of topography. Further mention of drainage needs is found with the discussion of each soil type.

Mineral resources. The important mineral resources of Will county are soil, dolomitic limestone, sand, gravel, clay, and coal. Of these, soil is by far the most important. The various kinds of

[1] Elevations are taken from U. S. Geological Survey topographic maps.

soil are discussed in detail in the body of this report.

Dolomite is quarried at several places, but primarily along Des Plaines valley (Fig. 6). Much of it is crushed for use in concrete and for agricultural limestone, although some is used for building blocks. The county also has several sand and gravel pits. The largest ones are in the outwash plain east of Plainfield and along Des Plaines valley (Fig. 6). Sand for building purposes and for molds is mostly screened from gravel in the same pits. Little use is made of clay materials at present.

The supply of coal is nearing depletion. Coal deposits occurred only in the southwestern part of the county, lying at depths varying from 25 to more than 100 feet and averaging about 3½ feet in thickness.

Peat and muck occur in limited amounts and some is mined for local use as lawn and garden dressing.

Water resources. Surface water and underground water are both relatively abundant. Kankakee, Des Plaines, and Du Page rivers are continuously flowing streams (Fig. 7), and the Chicago Sanitary and Ship Canal is kept at a high level by diversion from Lake Michigan. Wells vary from shallow (20 feet or less in depth) to deep (more than 200 feet). The shallowest wells tend to be in the gravelly outwash plains, such as in the vicinity of Plainfield. The deepest wells, those that penetrate waterbearing rock strata, are 1,000 feet or more deep. These generally enter St. Peters sandstone, "Potsdam" sandstone, or some layer of the Prairie du Chien series (7). Most of the water from deep wells is "hard" or highly mineralized. It is particularly high in dissolved calcium and magnesium.

Climate.[1] Will county is in a region of changeable weather. The climate is pre-

[1] This section on climate was prepared in cooperation with R. W. Harms, State Climatologist, U. S. Weather Bureau and Illinois State Water Survey (*25*).

Dolomitic limestone (top), gravel (center), and coal (bottom) are three important mineral products being strip-mined in Will county, although the supply of strippable coal is nearing depletion. (Fig. 6)

Des Plaines river is a deep waterway between Illinois river and Lockport, where the Chicago Sanitary and Ship Canal becomes the deep waterway connecting with Lake Michigan. (Fig. 7)

dominantly continental, with relatively warm summers and relatively cold winters, but modified somewhat by Lake Michigan. A lake breeze often reduces summer temperatures several degrees during the later part of the day. This is particularly noticeable in the eastern part of the county. There, in general, a given temperature tends to occur five to seven days later than in the northwest corner of the county (*25*).

Mean annual temperature at the Joliet weather station is about 50° F. Mean maximum is about 61° F. and mean minimum about 40° F. Highest temperature recorded to date was 109° F. in July, 1936, and the lowest was −25° F. in December, 1872. Some monthly temperature data for Joliet are given in Table 1.

May 2 is the average date of the last killing frost in spring; and October 11, of the first killing frost in fall. This gives an average frost-free season of 162 days. In most years the "killing frost" date comes within a day or two of the last occurrence of 32° F. in spring and the first occurrence in fall (*10*).

Because some crops (such as oats, barley, spinach, and cabbage) can resist one or more "killing frosts," growers may find the probability of several low temperatures more important than the dates of killing frosts. Construction engineers, too, may find such data helpful. The probabilities of temperatures below 32°, 28°, 24°, 20°, and 16° F. occurring in central Will county after a certain date in spring or before a certain date in fall are given in Table 2 (*10*).

Yearly precipitation (rainfall and melted snowfall) at Joliet averages about 34 inches. Between 1893 and 1952, the highest recorded in any one year was 56 inches in 1902 and the lowest was 24 inches in 1912 (Table 3).

Table 1. — SELECTED TEMPERATURE DATA, JOLIET WEATHER STATION, 1893-1952

Temperature	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
						degrees Fahrenheit							
Av. daily max.	33	35	47	60	72	82	87	85	77	66	49	36	61
Av. daily min.	17	18	28	37	48	57	62	61	54	42	31	21	40
Highest recorded...	67	69	84	92	101	104	109	105	103	96	86	67	109
Lowest recorded...	−20	−23	−6	8	27	34	43	36	26	14	−3	−25	−25

Table 2. — PROBABILITY OF GIVEN TEMPERATURES OCCURRING LATER IN SPRING OR EARLIER IN FALL THAN CERTAIN DATES

Probability of later and earlier occurrence	32°F.	28°F.	24°F.	20°F.	16°F.
5 yr. in 10 later than (mean date)	May 4	April 19	Mar. 30	Mar. 23	Mar. 10
2 yr. in 10 later than	May 14	April 29	April 9	April 2	Mar. 20
1 yr. in 10 later than	May 21	May 6	April 16	April 9	Mar. 27
1 yr. in 10 earlier than	Sept. 25	Oct. 9	Oct. 21	Oct. 31	Nov. 10
2 yr. in 10 earlier than	Oct. 1	Oct. 15	Oct. 27	Nov. 6	Nov. 16
5 yr. in 10 earlier than (mean date)	Oct. 11	Oct. 25	Nov. 6	Nov. 16	Nov. 26

During the growing season, April through September, rainfall averages about 21 inches. About one year in four it is less than 17 inches and one year in seven it is more than 25 inches.

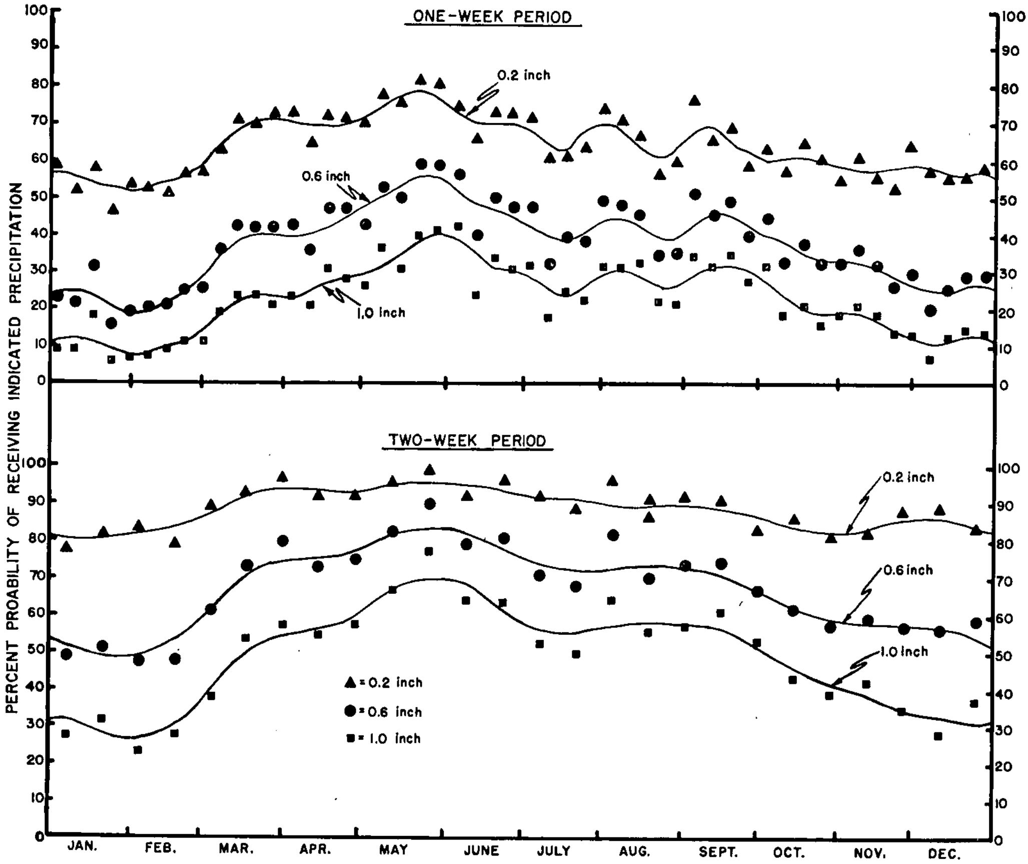
Data from the Aurora College weather station (about 5 miles northwest of the northwest corner of Will county) were used by Barger, Shaw, and Dale (*1*) to analyze the frequency of certain amounts of precipitation. The chances of receiving 0.2, 0.6, and 1.0 inch amounts of precipitation for each 1- or 2-week period vary somewhat throughout the year, but are greater in spring and summer than in winter and fall (Fig. 8). This information should apply to much of Will county although many local variations occur.

The probable frequency of heavy rainstorms in Illinois has been analyzed by Huff and Neill (*9*). In Will county, for any one 24-hour period, a 3-inch rain may be expected once each 5 years, a 4-inch rain once every 15 years, and a 5-inch rain once in about 30 years. For a 48-hour period a 3-inch rainfall may be expected once each 3 years, a 4-inch rainfall once each 6 to 7 years, and a 5-inch rainfall once every 15 years. As time periods are increased to 3, 5, or 10 days, the probability of a heavy rainfall becomes relatively greater. The heaviest short-lasting rains are more likely to occur in June than in any other month, and 60 percent of them occur from June through September.

Lightning and thunder accompany most short-period intense rains, particularly in summer, although some thunderstorms produce little precipitation. June has an average of about seven thunderstorms, July about six, and May and August about five each. Very few thunderstorms occur during November, December, January, and February.

Table 3. — SELECTED PRECIPITATION DATA, JOLIET WEATHER STATION, 1893-1952

Precipitation	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
						inches							
Av. total	1.9	1.6	2.8	3.3	3.9	3.8	3.3	3.2	3.7	2.5	2.3	2.1	34.4
Highest recorded	6.7	4.3	6.1	9.3	7.5	12.9	9.4	7.0	12.3	12.4	5.5	7.1	56.1
Lowest recorded	.1	.1	.2	.4	.7	.5	.2	.6	.3	.4	.1	.4	24.1
1 yr. in 10 will be more than	3.0	2.5	4.5	5.0	6.0	7.0	5.2	5.0	6.5	4.5	4.4	3.2	42.0
1 yr. in 10 will be less than	.7	.5	1.3	1.2	1.6	1.4	1.0	1.3	1.0	.8	.6	.6	26.0



Percent chance of receiving 0.2, 0.6, and 1.0 inch of rainfall during 1- and 2-week periods. Solid lines are smoothed 3-period averages. Based on records of Aurora College weather station. (Fig. 8)

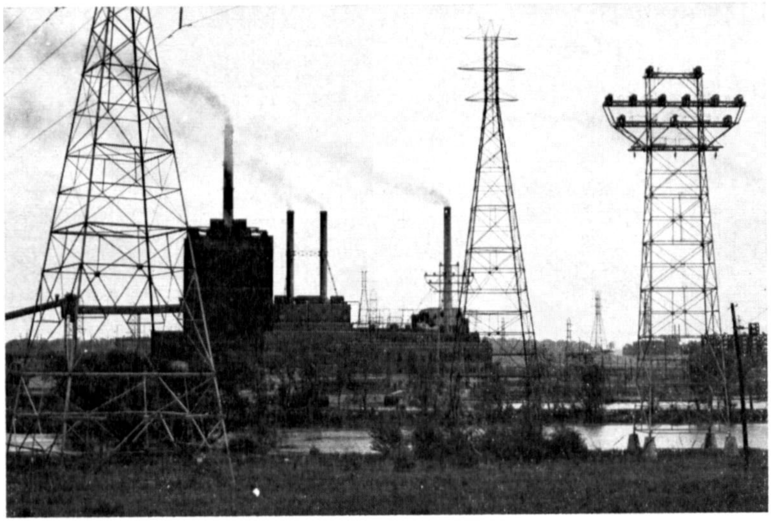
On the average, one or two hailstorms occur at any one spot each year. Some years, none will occur in a given area; more than two a year are rare. Intensities vary from a few hailstones in some instances to severe damage in others. The more intensive storms usually occur in March and April, when few crops are damaged. In general, hailstorms occur mostly between 2:00 and 8:00 p.m. (*8*).

CULTURAL FEATURES OF WILL COUNTY

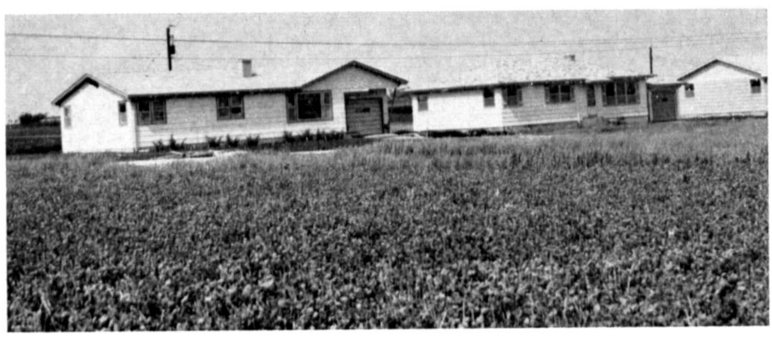
Organization and population. The first permanent white settlers entered the territory that is now Will county shortly before 1830. Joliet was laid out in 1834. The county was established by legislative act in January, 1836, but its present boundaries were not set until 1853.

Following Blackhawk's war the population increased rapidly and consistently from 1840 through 1960. In 1960 the reported total population was 191,617. Of this number, 135,565 were listed as urban and 56,052 as rural (*23*). Included as rural are all persons living in towns of less than 2,500 population as well as actual farmers.

Transportation and industrial development. Facilities for transporting agricultural and industrial products are well developed. Railroads and paved high-



Electrical power is an important resource of the Des Plaines valley. The river is shown in the foreground. (Fig. 9)



New housing subdivisions are often laid out on some of the most productive agricultural land. (Fig. 10)

ways traverse the county in several directions and nearly all the tributary country roads are covered with some form of all-weather surface, primarily gravel or blacktop. The Chicago Sanitary and Ship Canal is suited to heavy barge traffic. Grain is shipped by barge from Will county while coal and oil are shipped into the county. Air transportation is available at airports near Joliet.

Industries are numerous and varied. Large and small mills, factories, and power plants of various kinds are located along Des Plaines valley (Fig. 9). Housing construction is very important in nearly all parts of the county (Fig. 10). Sand, gravel, and limestone are mined for concrete work and other purposes. Although much of the soil information in this report may not be of first importance in locating and operating a factory or housing development, some of it is valuable for indicating areas with good foundation material, adequate drainage conditions, good topsoil, and deposits of sand, gravel, peat, and muck.

Agriculture. Grain and livestock farming and market gardening have long been and should continue to be important industries in Will county (Fig. 1). In 1959, there were 2,366 farms consisting of 3 or more acres used for agricultural purposes (*23*). These totaled 412,509 acres. Corn was grown on 152,201 acres with an average acre yield of 64 bushels; soybeans on 82,443 acres, yielding an average of 28 bushels per acre; oats on 54,298 acres, averaging 40 bushels per acre; and wheat on 12,162 acres with an average yield of 41 bushels. Other crops included truck crops, rye, barley, alfalfa

Table 4. — LIVESTOCK AND CHICKENS ON WILL COUNTY FARMS, 1910-1960

Kind of animal	1910	1920	1930	1940	1950	1960
Dairy cows	22,900	30,600	17,800	19,000	15,000	13,000
Other cattle	16,700	13,300	13,200	17,900	23,500	29,800
Hogs	34,400	47,300	18,700	24,600	34,700	37,500
Sheep	4,700	3,200	3,300	3,900	5,200	4,800
Horses and mules	24,600	21,700	13,100	8,700	2,300	......
Chickens	447,100	370,200	328,800	260,700	244,100	243,000

for hay, and various legumes and grasses cut for seed, hay, and silage. Total value of all grain and hay crops grown in Will county in 1959 was estimated at $19,-337,600.

The trend in numbers of livestock and chickens, according to U. S. Census figures from 1910 through 1960, are given in Table 4. Dairy cattle numbers have declined since reaching a peak in 1920, and chickens have been decreasing in number since 1910. Beef cattle and hogs, however, have increased in every decade since 1930. According to Illinois Crop Reporting Service, all classes of livestock declined slightly from 1959 to 1960. Total farm inventory value of livestock as of January 1, 1960, was $7,953,200.

DESCRIPTIONS OF WILL COUNTY SOILS

The various soil types in Will county are discussed in numerical order on the following pages. Numbers correspond to those used on the colored map at back, and in Tables 5 and 30. Profile characteristics are described in detail. Horizon thickness and structure are also shown by generalized drawings.

Each description applies to a specific soil section, but a few descriptions have been modified according to observations of other profiles of the same type in the county. Drawings tend to show the soil horizons of the accompanying descriptions without many variations. As discussed on pages 4 and 5, horizons are designated by letters. Along with the drawings are given the depths from the soil surface to the top and bottom of each horizon. These depths are for uneroded conditions. The variable thickness appended to the description of each horizon shows the range that may occur in that horizon. Munsell color notations[1] and consistence are for moist soils.

Special attention is directed to soils formed in sandy materials, for differences in B horizon development can definitely affect soil use and the kinds of crops that may be successfully grown. Soils with no textural B above 4 or 5 feet will have a lower water-holding capacity and be more drouthy than those with a slightly to moderately textured B.

A key to Will county soils arranged according to oxidation, native vegetation, B horizon development, and parent material is given in Table 26 (page 80).

[1] These notations refer to soil color standards developed by the Munsell Color Company, Inc. The notations consist of three variables: hue, value, and chroma. In the notation 10YR 4/2, for example, the hue is denoted by the 10YR (YR=yellow-red), the value by the 4, and the chroma by the 2. Hue is the dominant spectral (rainbow) color and is related to the dominant wave length of the reflected light. Value refers to the relative lightness of color and is a function of the total amount of light. Chroma is the relative purity or strength of the spectral color.

Table 5. — WILL COUNTY SOILS: Areas of Different Types

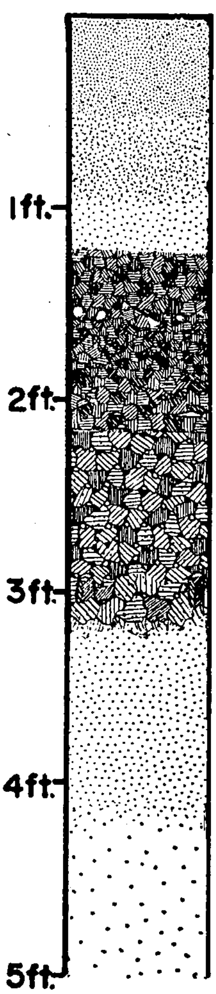
Type No.	Type name	Area in square miles	Area in acres	Percent of total area
20	Woodland fine sandy loam	1.45	930	.17
23	Blount silt loam	45.80	29,311	5.42
24	Miami silt loam	4.06	2,601	.48
25	Hennepin loam	.32	206	.04
49	Watseka loamy fine sand	8.33	5,332	.99
54	Plainfield sand	8.12	5,197	.96
59	Lisbon silt loam	9.16	5,867	1.08
62	Herbert silt loam	.95	606	.11
67	Harpster silty clay loam	1.67	1,071	.20
69	Milford silty clay loam to clay	1.22	779	.14
73	Huntsville loam, bottom	13.13	8,409	1.55
80	Alexis silt loam	1.69	1,082	.20
82	Millington loam, bottom	1.56	995	.18
88	Hagener loamy sand	1.67	1,071	.20
89	Maumee fine sandy loam	12.57	8,047	1.49
93	Rodman gravelly loam	3.67	2,347	.43
102	LaHogue loam	4.90	3,137	.58
103	Houghton muck	3.25	2,082	.38
130	Pittwood fine sandy loam	5.41	3,461	.64
131	Alvin fine sandy loam	4.53	2,899	.54
132	Starks silt loam	1.28	827	.15
134	Camden silt loam	2.76	1,763	.33
145	Saybrook silt loam	27.35	17,506	3.24
146	Elliott silt loam	158.89	101,692	18.80
148	Proctor silt loam	8.64	5,532	1.02
149	Brenton silt loam	9.98	6,387	1.18
151	Ridgeville fine sandy loam	4.70	3,007	.56
152	Drummer silty clay loam	62.85	40,225	7.44
157	Rankin sandy loam	.80	514	.09
189	Martinton silt loam	.61	389	.07
190	Onarga fine sandy loam	1.88	1,201	.22
194	Morley silt loam	26.63	17,041	3.15
196	Harpster fine sandy loam	1.25	800	.15
197	Troxel silt loam	3.03	1,936	.36
206	Thorp silt loam	.25	157	.03
210	Lena muck	.47	303	.06
219	Millbrook silt loam	1.32	844	.16
220	Plattville silt loam	2.57	1,644	.30
228	Eylar silt loam	2.11	1,352	.25
232	Ashkum silty clay loam	144.33	92,374	17.08
235	Bryce clay loam to clay	15.11	9,670	1.79
238	Rantoul silty clay	.35	222	.04
241	Chatsworth silty clay to clay	1.83	1,168	.22
270	Oquawka sand	4.17	2,666	.49
290	Warsaw silt loam	12.12	7,755	1.43
290-318	Warsaw-Lorenzo silt loams, undifferentiated	6.35	4,061	.75
293	Andres silt loam	9.67	6,187	1.14
294	Symerton silt loam	13.47	8,620	1.59
295	Mokena silt loam	1.17	752	.14
298	Beecher silt loam	77.88	49,846	9.22
311	Ritchey silt loam	2.04	1,303	.24
313	Rodman loam	1.75	1,119	.21
314	Joliet silt loam to silty clay loam	6.05	3,872	.72
315	Channahon silt loam	4.71	3,012	.56
316	Romeo silt loam	11.80	7,550	1.40
317	Millsdale silty clay loam	4.24	2,715	.50
318	Lorenzo silt loam	8.42	5,386	1.00
320	Frankfort silt loam to silty clay loam	27.54	17,625	3.26
321	DuPage silt loam, bottom	2.23	1,428	.26
325	Dresden silt loam	1.29	827	.15
326	Homer silt loam	.47	303	.06
327	Fox silt loam	3.01	1,925	.36
329	Will silty clay loam	4.75	3,039	.56
330	Peotone silty clay loam	3.22	2,060	.38
L. Q.	Limestone Quarry	.68	433	.08
G. P.	Gravel Pit	3.02	1,931	.36
M. D.	Mine Dump or Strip Mine	6.82	4,364	.81
M. L.	Made Land	6.32	4,045	.75
	Water	9.36	5,992	1.11
	Total	845.00	540,800	100.00

Woodland fine sandy loam (20)[2]

Woodland fine sandy loam is a light-colored, imperfectly oxidized Gray-Brown Podzolic[3] soil (Table 28). It formed in sandy water-deposited sediments under deciduous hardwood forest. It occurs on nearly level to very gently sloping areas (less than 1½ percent gradient), mostly in the southwestern part of the county, in association with Alvin, Plainfield, and other sandy soils.

Woodland is strongly acid, low in organic matter, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is medium in the B horizon but low in the C or underlying loose sand. Productivity is low unless the soil is limed and adequately fertilized. Satisfactory yields of most grain crops also depend on adequate moisture during the growing season (Table 30, page 92). Crop residues or other organic matter should be returned each year. Corn or soybeans should not appear in the rotation more than twice every four or five years. Small grains and grass and legume forage crops are better adapted than corn.

Representative profile, Woodland fine sandy loam



A_p (0-7″)

A_p. Dark grayish-brown (10YR 4/2) very friable fine sandy loam; very weak, fine crumb structure; very strongly acid; abrupt smooth boundary; A_1 is 1 to 5 inches thick in unplowed areas.

A_{2-1} (7-11″)

A_{2-1}. Grayish-brown (10YR 5/2) very friable fine sandy loam; very weak, fine platy in place, breaking to very weak, fine crumb; very strongly acid; few fine, firm iron-manganese concretions; clear smooth boundary; 4 to 10 inches thick.

A_{2-2} (11-15″)

A_{2-2}. Brown (10YR 5/3) very friable loamy fine sand; very weak, fine crumb structure; very strongly acid; few fine iron-manganese concretions; abrupt smooth boundary; 0 to 5 inches thick.

B_{2-1} (15-25″)

B_{2-1}. Grayish-brown (2.5Y 5/2) firm clay loam, with common, fine, distinct yellowish-brown (10YR 5/4-5/6) mottles; weak, fine to medium subangular blocky structure; very strongly acid; few fine iron-manganese concretions; clear smooth boundary; 6 to 12 inches thick.

B_{2-2} (25-35″)

B_{2-2}. Yellowish-brown (10YR 5/4) firm clay loam grading to friable fine sandy loam in lower part, with common, fine, distinct grayish-brown (10YR 5/2), yellowish-brown (10YR 5/6), and brownish-yellow (10YR 6/6) mottles; weak, fine to medium subangular blocky structure; very strongly acid; few fine iron-manganese concretions; clear smooth boundary; 8 to 15 inches thick.

B_3 (35-50″)

B_3. Grayish-brown (2.5Y 5/2) very friable to loose fine sandy loam to loamy fine sand, with common, fine, faint brown to yellowish-brown (10YR 5/3-5/4) mottles; medium acid; clear smooth boundary; 5 to 20 inches thick.

C (50-60″+)

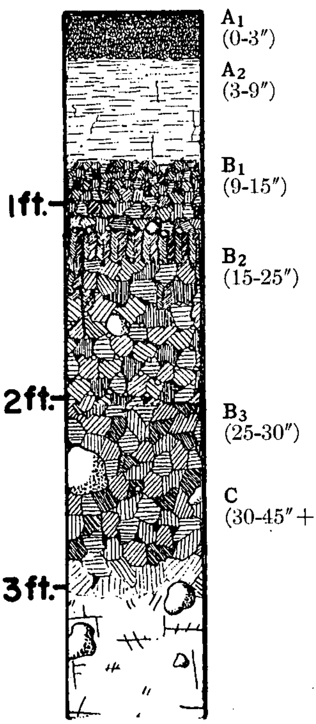
C. Gray (2.5Y 6/1) very friable to loose stratified fine sandy loam and loamy fine sand with common, fine, distinct, yellowish-brown (10YR 5/4) mottles; neutral.

[2] After the soil map was printed, Woodland was recorrelated as Roby fine sandy loam (No. 184).
[3] Soil classification, U. S. Dept. Agr. Yearbook of Agriculture, Soils and Men, 1938.

Blount silt loam (23)

Blount silt loam is a light-colored, imperfectly oxidized Gray-Brown Podzolic soil formed in silty clay loam till with a surficial covering of less than 2 feet of medium-textured drift (including loess). It developed under deciduous hardwood forest on nearly level to gently rolling areas (less than 2 to 3 percent slopes). It occurs

Representative profile, Blount silt loam



A_1. Very dark gray to dark gray (10YR 3/1-4/1) friable silt loam; moderate, fine or medium crumb to granular; medium acid; abrupt smooth boundary; 1 to 5 inches thick in unplowed areas.

A_2. Dark grayish-brown to grayish-brown (10YR 4/2-5/2) friable silt loam; weak, very fine to fine platy structure in place, breaking to weak, fine to medium crumb; strongly acid; abrupt smooth boundary; 5 to 14 inches thick.

B_1. Dark grayish-brown to brown (10YR 4/2-4/3), mottled brown and yellowish-brown (10YR 5/3 and 5/6); firm silty clay loam with an occasional pebble; moderate, fine subangular blocky structure with some light brownish-gray (10YR 6/2) silty coatings; strongly acid; clear smooth boundary; 2 to 6 inches thick.

B_2. Mixed dark grayish-brown, brown, and yellowish-brown (10YR 4/2, 4/3, 5/3, and 5/6) very firm silty clay with an occasional pebble; strong, fine to medium subangular blocky structure; strongly acid in upper part to slightly acid in lower part; clear smooth boundary; 8 to 16 inches thick.

B_3. Mixed dark grayish-brown, yellowish-brown, and olive brown (10YR 4/2, 5/4, and 2.5Y 4/4) very firm silty clay with an occasional pebble; coarse, irregular blocky structure with some dark (10YR 3/1-3/2) waxy coatings; neutral; clear smooth boundary; 2 to 6 inches thick.

C. Gray and light yellowish-brown (10YR 6/1 and 6/4), mottled with olive brown (2.5Y 4/4) and with seams of light gray (10YR 7/2) in upper few inches; firm silty clay loam with a few pebbles; medium to coarse irregular blocky structure in upper part to massive at lower depths; calcareous. Calcareous till contains between about 25 and 36% clay <2 microns in diameter (Table 25).

Table 6. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF BLOUNT SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p	0–7	2.7	22.2	58.8	19.0	5.6	2.3	.33	10.0	84	5.3	1.99
A_2	7–10	19.5	23.7	55.4	20.9	5.0	1.7	.19	8.2	84	5.1	.60
B_1	10–13	27.7	21.8	42.7	35.5	6.9	3.7	.26	14.4	76	4.9	.51
B_{2-1}	13–19	1.6	10.6	39.2	50.2	8.6	5.7	.37	18.0	77	4.7	.49
B_{2-2}	19–25	.9	9.3	43.0	47.7	11.8	6.7	.33	16.0	100+	6.4	.56
C	31–37	2.4	10.6	54.5	34.9	....[c]	...	...	....	...	7.8	.47

[a] Will County, Twp. 34N, Range 14E, Sec. 24, SW ¼, SE 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

in association with Morley, Beecher, and other soils in many parts of the county. Some physical and chemical properties of a Blount soil are given in Table 6.

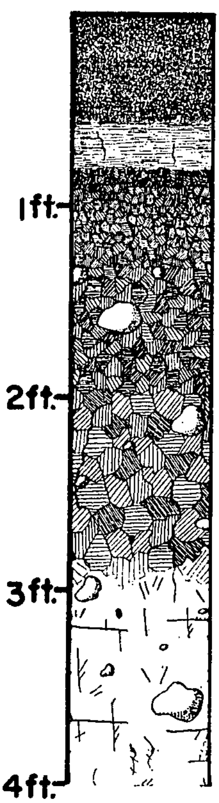
Blount is low in organic matter, medium to strongly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high, but permeability in the lower solum and underlying till is slow. Drainage is needed in some areas, but water movement to tile is slow and surface furrows or ditches may prove more satisfactory than tile. Productivity is medium where the soil is properly fertilized and otherwise well managed (Table 30).

Miami silt loam (24)

Miami silt loam is a light-colored, moderately well- to well-oxidized Gray-Brown Podzolic soil. Parent material is a loam to silt loam till with less than 15 ± 3 inches of surficial loess. The till is calcareous at depths of less than 42 inches. Miami developed under deciduous hardwood forest on moderately to strongly rolling areas (slopes ranging from 2 to 18 percent). It occurs mostly in the northern part of the county in association with Herbert and Saybrook. Some physical and chemical properties of a Miami soil are given in Table 7.

Miami is low in organic matter, medium to strongly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is medium. Erosion is a problem on slopes greater than 3 or 4 percent. Productivity is medium to moderately high under good management

Representative profile, Miami silt loam



A_p (0-7")
A_2 (7-10")
B_1 (10-14")
B_2 (14-28")
B_3 (28-32")
C (32-48"+)

A_p. Dark grayish-brown to brown (10YR 4/2-5/3) friable silt loam; weak, fine to medium crumb structure; medium acid; abrupt smooth boundary; A_1 is 1 to 5 inches thick in unplowed areas.

A_2. Brown to light yellowish-brown (10YR 5/3-6/4) friable silt loam; weak, fine platy structure breaking to weak, fine to medium crumb; strongly acid; abrupt smooth boundary; 5 to 12 inches thick.

B_1. Brown to yellowish-brown (10YR 4/3-5/4) slightly firm silty clay loam borderline to silt loam; weak to moderate, fine subangular blocky structure with some pale brown (10YR 6/3) silty coatings; strongly acid; clear smooth boundary; 3 to 8 inches thick.

B_2. Brown to yellowish-brown (10YR 4/3 to 5/4-5/6) firm silty clay loam with occasional pebbles; moderate, medium subangular blocky structure; strongly acid in upper part to slightly acid in lower part; clear smooth boundary; 12 to 18 inches thick.

B_3. Brown (10YR 4/3-5/3) with few, fine, faint yellowish-brown (10YR 5/4-5/5) mottles; moderately firm silty clay loam with occasional pebbles; weak, medium to coarse subangular blocky structure, with some dark (10YR 3/2) organic-clay coatings; neutral; clear wavy boundary; 2 to 8 inches thick.

C. Yellowish-brown to light yellowish-brown (10YR 5/4-6/4) moderately firm silt loam to loam usually with a few pebbles; massive; calcareous. Calcareous till contains between about 15 and 27% clay <2 microns in diameter (Table 25).

Table 7. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF MIAMI SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–3	.7	29.5	57.6	12.9	11.4	3.7	.28	13.4	100+	7.1	2.44
A_{2-1}....	3–7	.2	31.3	56.3	12.4	3.2	1.8	.14	6.9	76	5.7	.80
A_{2-2}....	7–10	.5	30.7	53.2	16.1	.9	1.8	.10	7.1	39	4.8	.50
B_1......	10–15	1.5	30.3	47.6	22.1	2.0	2.9	.17	11.0	47	4.7	.42
B_{2-1}....	15–18	3.1	27.1	42.8	30.1	4.4	4.0	.25	15.2	58	4.7	.57
B_{2-2}....	18–22	4.5	29.7	39.6	30.7	6.3	4.3	.24	15.0	73	5.0	.54
B_3......	22–29	2.7	31.2	38.5	30.3	9.3	5.0	.23	13.3	100+	6.3	.44
C......	34–40	6.0	34.0	46.4	19.6	....[c]	...	...	....	....	8.0	.36

[a] Iroquois County, T.27N, R.11W, Sec. 21, SW ¼, SW 40, SW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

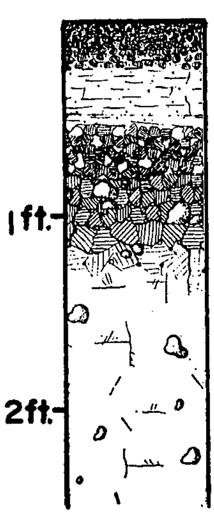
(Table 30). On slopes greater than 3 to 4 percent the cropping systems should consist primarily of small grain and sod crops rather than row crops, unless well-planned soil conservation practices are used.

Hennepin loam (25)

Hennepin loam is a light-colored, well-oxidized soil formed in till of loam or silt loam texture with little or no surficial loess. It developed under deciduous hardwood forest on strongly rolling topography (greater than 15 to 18 percent slopes). It occurs in the northern part of the county in association with Miami and other soils. It is classed as a Regosol intergrade to Gray-Brown Podzolic soil.

Hennepin is low in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is

Representative profile, Hennepin loam



A_1 (0-3″)
A_2 (3-6″)
B_2 (6-12″)
B_3 (12-15″)
C (15-30″+)

A_1. Dark gray (10YR 4/1) friable loam or gritty silt loam; weak, fine to medium crumb structure; neutral; abrupt smooth boundary; 1 to 5 inches thick.

A_2. Dark grayish-brown to brown (10YR 4/2-5/3) friable silt loam; weak, fine crumb structure; neutral; abrupt smooth boundary; 2 to 5 inches thick.

B_2. Brown (10YR 4/3) moderately firm silty clay loam; weak, fine subangular blocky structure; neutral; clear smooth boundary; 0 to 10 inches thick.

B_3. Brown (10YR 5/3) slightly firm silt loam borderline to silty clay loam; weak, medium subangular blocky structure; neutral; clear smooth boundary; 0 to 5 inches thick.

C. Brown to yellowish-brown (10YR 5/3-5/4) slightly firm loam to silt loam; massive; calcareous.

Many areas mapped Hennepin loam in Will County are severely eroded and much or all of the A and B horizons as described here are absent.

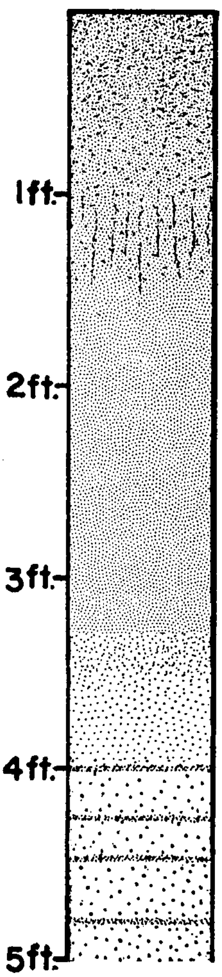
high and permeability is moderate. Erosion is a serious problem when slopes of Hennepin soil are cleared of native vegetation. Slopes greater than 20 to 25 percent should not be plowed but should remain in forest or seeded to permanent sod.

Watseka loamy fine sand (49)

Watseka loamy fine sand is a dark, weakly developed, imperfectly oxidized Brunizem soil. It formed in sandy water-deposited sediments under tall-grass prairie. It occurs on very gently sloping areas (½ to 1½ percent gradient), mostly south and west of Kankakee river in the southwestern part of Will county, in association with Plainfield, Oquawka, Maumee, and other sandy soils.

Watseka varies from slightly to strongly acid to a depth of 40 inches. It is low to medium in organic matter, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is low and the soil tends to be drouthy if the water table is not maintained within the plant rooting zone. Productivity is low unless depth to water table is controlled and adequate liming and fertilizing materials are applied. Crop residues or other fresh organic matter should be re-

Representative profile, Watseka loamy fine sand



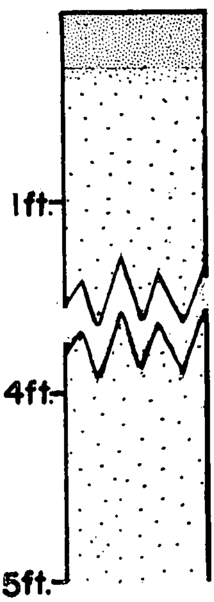
A_p (0-7″)	A_p. Very dark brown (10YR 2/2) very friable to loose loamy fine sand; very weak crumb structure to single grain; medium acid; abrupt smooth boundary. A_1 varies from 10 to 25 inches or more in thickness.
A_{1-2} (7-12″)	A_{1-2}. Very dark grayish-brown (10YR 3/2) very friable to loose loamy fine sand; very weak crumb structure to single grain; strongly acid; clear smooth boundary; 4 to 18 inches thick.
A_{3-1} (12-17″)	A_{3-1}. Dark yellowish-brown (10YR 4/5), with channel fillings of very dark grayish-brown (10YR 3/2) from horizon above; very friable to loose loamy fine sand; single grain; strongly acid; gradual smooth boundary; 5 to 10 inches thick.
A_{3-2} (17-40″)	A_{3-2}. Light brownish-gray, pale brown to light yellowish-brown (10YR 6/2-6/3-6/4) mottled with yellowish-brown (10YR 5/6); loose fine sand; single grain; medium acid; gradual smooth boundary; 0 to 20 inches thick.
C_1 (40-50″)	C_1. Grayish-brown (10YR 5/2) grading to gray (10YR 5/1) loose sand to fine sand with varicolored sand grains; single grain; neutral; abrupt smooth boundary; 5 or more inches thick.
C_2 (50-60″+)	C_2. Dark gray (2.5Y 4/1-5Y 4/1) stratified sand, fine sand, fine sandy loam (sometimes silt loam); calcareous. This soil may or may not be calcareous above 60″.

turned each year. Wind erosion is a problem and cultivated crops should be planted in strips 10 to 20 rods wide between strips of sod. The crop strips should be planted at right angles to the prevailing westerly winds. Estimated yields for several important crops grown in Will county are shown in Table 30 but other crops, such as rye, melons, and sweet potatoes, may produce more income.

Plainfield sand (54)

Plainfield sand is a light-colored, well-oxidized soil. It formed under deciduous hardwood forest primarily in sandy sediments that were originally deposited by waters of the Kankakee torrent (*5*) and were later reworked by the wind. This type occupies gently to strongly sloping knolls and ridges (1 to 15 or 18 percent gradient),

Representative profile, Plainfield sand



A_1 (0-4")

A_3 (4-60")

A_1. Dark brown (10YR 3/3) loose sand to fine sand; single grain; strongly acid; gradual smooth boundary; 2 to 5 inches thick.

A_3. Yellowish-brown (10YR 5/4) loose sand to fine sand; single grain; strongly acid in upper part, medium acid in lower part; usually 60 or more inches thick.

What is known as an A_3-B_2 horizon is usually found at 60 to 80 inches or sometimes deeper. It is yellowish-brown (10YR 4/4) loose sand to fine sand, interlayered with thin strata of dark yellowish-brown to brown (10YR-7.5YR 4/4) loamy fine sand to fine sandy loam.

In a few areas the brownish B_2 horizon bands or layers occur a few inches above 5 feet. In a few other areas a very weakly cemented layer, which may be a weak upper B horizon, occurs between 20 and 40 inches.

Plainfield, Oquawka, and Hagener soils are eroded by wind unless protected by a cover of vegetation. Blow-outs are unproductive until stabilized; then certain species of trees will make a fair growth, as shown in background. (Fig. 11)

mostly along Kankakee river and to the southwest. It occurs in association with Alvin, Oquawka, Watseka, Maumee, and other sandy soils. It is classed as Gray-Brown Podzolic intergrading to Regosol.

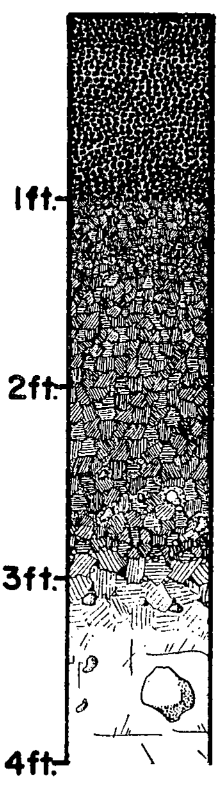
In general Plainfield sand is strongly acid, low in organic matter and plant nutrients, drouthy, and very susceptible to wind erosion (Fig. 11). Productivity is low for general farm crops (Table 30). A few early-maturing small grains such as rye, drouth-resistant crops such as cowpeas, or deep-rooting legumes such as alfalfa, may do fairly well in favorable seasons when properly fertilized. Clean-tilled crops should be strip-planted with sod crops, with the strips no more than 20 rods wide and laid out at right angles to the prevailing westerly winds. Plantings of adapted trees such as red, white, and jack pine have been profitable on this soil in some areas.

Lisbon silt loam (59)

Lisbon silt loam is a dark, imperfectly oxidized Brunizem soil formed in 1½ to 3 feet of silty material which may be partly loess, on loam or silt loam till. Solum (A and B horizons) ranges between 24 and 42 inches in thickness. The soil developed under prairie vegetation on very gently sloping topography (less than 2 percent slope). It occurs in the northwestern part of the county in association with Saybrook, and Drummer soils.

Lisbon is high in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. Drainage is needed for best crop growth, and tile function well. Productivity is high under good management (Table 30).

Representative profile, Lisbon silt loam



A_1 (0-12″)

A_3 (12-16″)

B_1 (16-18″)

B_2 (18-32″)

C (32-48″+)

A_1. Black (10YR 2/1) friable silt loam borderline to silty clay loam; moderate, medium crumb to granular structure; slightly acid; gradual smooth boundary; 9 to 16 inches thick.

A_3. Very dark gray to very dark brown (10YR 3/1-2/2) with few, fine, faint very dark grayish-brown to dark brown (10YR 3/2-4/3) mottles; moderate coarse granular to very fine subangular blocky structure; moderately firm silty clay loam borderline to silt loam; slightly acid; clear smooth boundary; 0 to 6 inches thick.

B_1. Mixed dark gray and yellowish-brown (10YR 4/1 and 5/4) firm silty clay loam; moderate, fine subangular blocky structure with dark (10YR 2/2) organic-clay coatings; slightly acid; clear smooth boundary; 0 to 5 inches thick.

B_2. Mixed grayish-brown and yellowish-brown (10YR 5/2, 5/4 and 5/6) firm silty clay loam usually with a few pebbles; moderate, medium subangular blocky structure, coarser in lower part; slightly acid in upper part to neutral in lower part; clear smooth boundary; 12 to 20 inches thick.

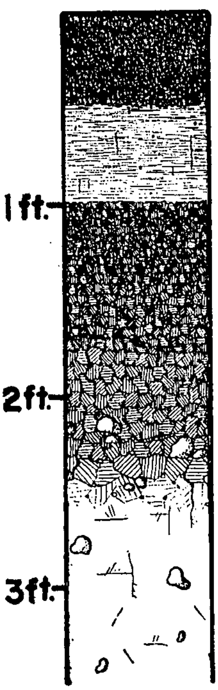
C. Gray (2.5Y 6/1) and yellowish-brown (10YR 5/4 and 5/6) friable to moderately firm loam to silt loam with some pebbles; massive; calcareous. Content of clay (<2 microns in diameter) ranges between about 15 and 27 percent in the calcareous till (Table 25).

Herbert silt loam (62)

Herbert silt loam is a moderately dark, imperfectly oxidized soil formed in 1½ to 3 feet of silty material which may be partly loess, on loam to silt loam till. The solum is 24 to 42 inches thick. This soil developed under mixed prairie-forest vegetation or under deciduous hardwood forest that encroached upon prairie within relatively recent times. It occupies gently sloping topography (slopes less than 2 to 3 percent). It occurs primarily in the northern part of the county in association with Miami and Saybrook soils. It is classed as an imperfectly oxidized Gray-Brown Podzolic soil intergrading to an imperfectly oxidized Brunizem soil.

Herbert is medium in organic matter, medium to strongly acid, and low to medium in available phosphorus and available potassium. Water-holding capacity is high and permeability is moderate. Drainage is needed in a few areas and tile function well. Productivity is moderately high under good management (Table 30).

Representative profile, Herbert silt loam



A_p (0-7″)	A_p. Very dark gray to dark gray (10YR 3/1-4/1) friable silt loam; weak, fine to medium crumb structure; medium acid; abrupt smooth boundary; A_1 is 6 to 12 inches thick in unplowed areas.
A_2 (7-12″)	A_2. Dark gray to grayish-brown (10YR 4/1-5/2) friable silt loam; weak, very fine to fine platy structure, breaking to weak, fine crumb; strongly acid; clear smooth boundary; 3 to 6 inches thick.
B_1 (12-16″)	B_1. Dark grayish-brown to brown (10YR 4/2-4/3), mottled with fine faint grayish-brown (10YR 5/2); slightly firm silty clay loam; moderate, fine subangular blocky structure with thin silty grayish-brown (10YR 5/2) coatings; strongly acid; clear smooth boundary; 2 to 6 inches thick.
B_{2-1} (16-22″)	B_{2-1}. Brown (10YR 4/3), mottled with yellowish-brown (10YR 5/4); firm silty clay loam; moderate, medium subangular blocky structure; strongly acid; clear smooth boundary; 4 to 10 inches thick.
B_{2-2} (22-28″)	B_{2-2}. Mixed gray, grayish-brown, brown, and yellowish-brown (10YR 5/1, 5/2, 5/3, and 5/4) firm silty clay loam; moderate, medium subangular blocky structure with dark (10YR 3/2) organic-clay coatings; slightly acid; clear smooth boundary; 6 to 10 inches thick.
IIB_3 (28-30″)	IIB_3. Grayish-brown (10YR 5/2), mottled with yellowish-brown (10YR 5/4); firm gritty silty clay loam; weak to moderate, medium subangular blocky structure; neutral; abrupt smooth boundary; 2 to 8 inches thick.
IIC (30-42″+)	IIC. Brown (10YR 5/3), mottled with dark yellowish-brown (10YR 4/4-7.5YR 4/4); friable to slightly firm loam to gritty silt loam borderline to clay loam; massive, calcareous. Clay content (<2 micron) in the calcareous till ranges between about 15 and 27% (Table 25).

Harpster silty clay loam (67)

Harpster silty clay loam is a dark, poorly oxidized soil formed in medium- to moderately fine-textured drift (mostly outwash sediments but also including some till, loess, or both). It developed under marsh vegetation in shallow depressions or around the margins of deeper depressions where the combination of shallow water and thick vegetation furnished a favorable habitat for fresh-water snails. This type occurs mostly in the western part of the county in association with Brenton, Drummer, and Ashkum. It is classed as a Humic-Gley soil. Some physical and chemical properties of a Harpster soil are given in Table 8.

Table 8. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF HARPSTER SILTY CLAY LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–11	0.0	26.2	44.8	29.0	....[c]	....	0.46	29.1	....	7.9	4.01
A_3......	11–17	0.0	24.8	47.9	27.3	....	....	0.31	20.9	....	8.0	1.79
B_1......	17–22	0.0	27.5	47.3	25.2	....	....	0.31	16.5	....	8.1	0.71
B_2......	22–32	0.0	27.3	47.6	25.1	....	....	0.33	14.0	....	8.1	0.35
B_3......	32–39	1.0	20.1	49.5	30.4	....	....	0.31	11.9	....	8.1	0.28
C_1......	39–45	3.0	40.1	40.9	19.0	....	....	0.23	6.4	....	8.1	0.20

[a] Iroquois County, T.26N, R.13W, Sec. 26, NW ¼, SW 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Representative profile, Harpster silty clay loam

A_1 (0-12″)

A_1. Black (10YR 1/1-2/1) slightly firm silty clay loam with abundant white (10YR 8/2) snail shells and shell fragments; weak to moderate, medium crumb to granular structure; calcareous; gradual smooth boundary; 10 to 18 inches thick. Where shell fragments are very abundant and finely divided the soil has a grayish (10YR 4/1-5/1) appearance.

A_3-B_1 (12-20″)

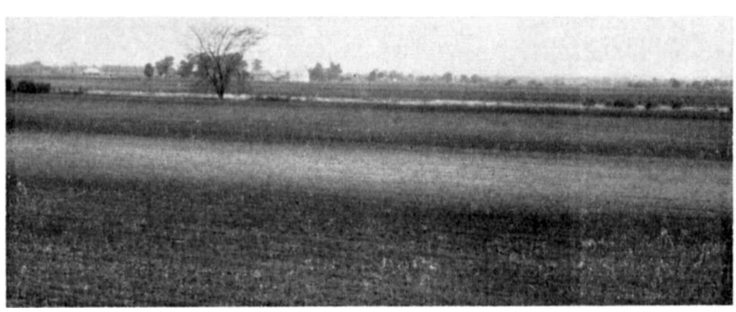
A_3-B_1. Very dark gray (10YR 3/1-2.5Y 3/1) mottled with yellowish-brown (10YR 5/4) and grayish-brown (2.5Y 5/2); slightly firm silty clay loam with numerous to abundant snail shells and shell fragments; very weak, fine to medium subangular blocky structure; calcareous; gradual smooth boundary; where separable each horizon (A_3 and B_1) may vary from 2 to 6 inches in thickness.

B_2 (20-32″)

B_2. Dark gray (2.5Y 4/1) with yellowish-brown (10YR 5/4) mottles; slightly firm silty clay loam with snail shells and shell fragments; very weak, fine prismatic structure breaking to weak, fine to medium angular blocky; calcareous; gradual smooth boundary; 0 to 12 inches thick.

C (32-60″+)

C. Gray (2.5Y to 5Y 5/1-6/1) with yellowish-brown (10YR 5/4-5/8) mottles and white (10YR 8/2) snail shells and fragments; friable to slightly firm stratified sandy loam to silt loam to silty clay loam; calcareous.



Gray streak in foreground is a strip of Harpster, 3 to 4 rods wide and about 20 rods long, in an area of Milford. Snail shells give this naturally dark soil its gray cast. The second strip of lighter colored soil is Oquawka sand. (Fig. 12)

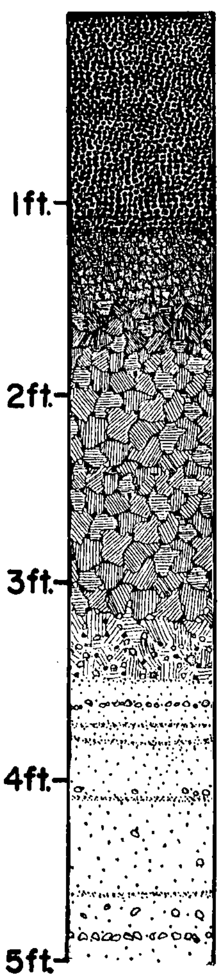
Harpster is high in organic matter, calcareous, and low in available phosphorus and available potassium. Water-holding capacity is high and permeability is moderate. Drainage is needed and tile function well. Productivity is high where the soil is well drained, properly fertilized, and otherwise well managed (Table 30). This soil is better suited to corn, legumes, and grasses than to small grains.

Limestone or other liming materials should not be applied to Harpster because there is already too much free calcium carbonate. Rock phosphate is ineffective in this calcareous soil.

Milford silty clay loam to clay (69)

Milford silty clay loam to clay is a very dark, poorly oxidized soil formed in 2 to 4 feet of fine-textured lacustrine sediments on stratified materials. These materials may be one or more of the following: silty clay, silty clay loam, silt loam, or sometimes somewhat coarser outwash. The soil developed under marsh vegetation on broad, nearly level areas or in shallow depressions where, before artificial drainage, the natural water table stood at or near the surface most of each year. This type

Representative profile, Milford silty clay loam to clay



A_1 (0-14″) — A_1. Black (10YR 1/1-2/1) firm silty clay loam to silty clay; moderate, fine to medium granular structure; slightly acid; gradual smooth boundary; 8 to 16 inches thick.

A_3 (14-18″) — A_3. Black to very dark gray (10YR 2/1-3/1) firm silty clay loam to silty clay; moderate, medium granular to fine subangular blocky structure; neutral; gradual smooth boundary; 3 to 6 inches thick.

B_2 (18-38″) — B_2. Dark gray to gray (5Y 4/1-5/1), mottled with dark yellowish-brown to yellowish-brown (10YR 4/4-5/4); firm silty clay; weak, medium to coarse subangular to angular blocky structure; neutral; gradual smooth boundary; 12 to 30 inches thick.

C (38-60″+) — C. Mixed dark gray and olive-brown (2.5Y 4/1 and 4/4) stratified silty clay loam, silt loam, and fine sandy loam; massive; weakly calcareous.

occurs in three places in the county — northeast of Frankfort, at Steger, and near the western border just south of Kankakee river — in association with Martinton and other soils. It is classed as a Humic-Gley soil. Some physical and chemical properties of a Milford soil are given in Table 9, page 26.

Milford is high in organic matter, slightly acid to neutral, low in available phosphorus, and medium in available potassium. Drainage is needed for satisfactory crop production. Tile function moderately well. Productivity is moderately high where the soil is adequately drained and well managed (Table 30).

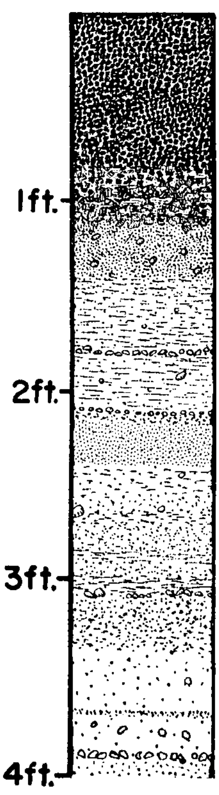
Huntsville loam (73)

Huntsville loam is a dark, moderately well-oxidized soil formed in medium-textured alluvial sediments 4 or more feet thick. Native vegetation is mostly prairie, often with scattered trees or brush, but the sediments are too recently deposited to have been greatly affected by vegetative cover. The soil occupies most of the small stream bottomlands in the eastern half of the county as well as some of Kankakee river bottom. It is classed as an Alluvial soil.

Huntsville is high in organic matter, neutral, variable in available phosphorus, and about medium in available potassium. Drainage may be needed in some areas for satisfactory grain farming. Productivity is high under good management (Table 30), but many of the small bottoms are narrow and subject to flooding. Pasture is the best use for most areas.

Areas of an imperfectly oxidized associate were included with Huntsville soil in Will county.

Representative profile, Huntsville loam



A_{1-1} (0-10″) — A_{1-1}. Black to very dark brown (10YR 2/1-2/2) friable loam to gritty silt loam; weak, medium crumb to granular structure; neutral; gradual smooth boundary; 10 to 30 inches thick.

A_{1-2} (10-16″) — A_{1-2}. Very dark grayish-brown (10YR 3/2) friable loam or gritty silt loam; weak, fine to medium crumb structure to massive; neutral to slightly acid; gradual smooth boundary; 0 to 10 inches thick.

A_{3-1} (16-25″) — A_{3-1}. Very dark grayish-brown to dark brown (10YR 3/2-3/3) friable loam to silt loam to gritty silty clay loam; stratified to massive; neutral to slightly acid; clear smooth boundary; 0 to 15 inches thick.

A_{3-2} (25-40″) — A_{3-2}. Very dark brown (10YR 3/3) mottled with grayish-brown and yellowish-brown (10YR 5/2, 5/4 and 5/6); friable gritty silty clay loam borderline to loam; massive; neutral to slightly acid; clear smooth boundary; 0 to 20 inches thick.

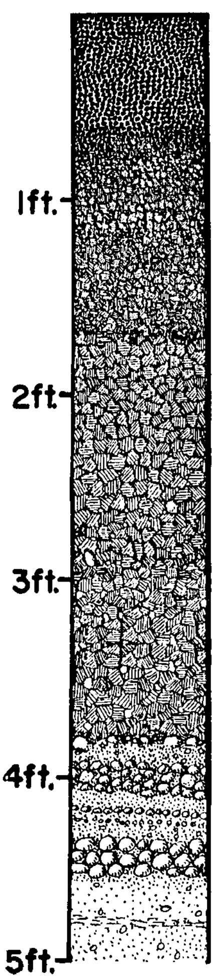
C (40-48″+) — C. Mixed grayish-brown (2.5Y 5/2) and brown (7.5YR 4/4) mottled with dark reddish-brown (5YR 3/4); friable stratified loam, silt loam, fine sandy loam, and fine sandy clay loam; neutral.

Table 9. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF MILFORD SILTY CLAY LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p.	0–9	0.2	20.1	40.3	39.6	23.7	8.3	.45	30.3	100+	6.5	3.06
A_{1-2}. . . .	9–18	0.0	17.0	41.6	41.4	24.0	8.3	.43	29.0	100+	6.1	1.59
B_1.	18–22	0.2	18.6	40.4	41.0	19.8	7.2	.39	26.9	100+	6.5	.85
B_{2-1}. . . .	22–31	1.1	19.6	41.0	39.4	18.5	6.3	.30	21.8	100+	7.5	.43
B_{2-2}. . . .	31–42	0.3	23.3	41.3	35.4	15.1	6.1	.38	19.7	100+	7.2	.31
B_{2-3}. . . .	42–52	0.2	20.8	45.4	33.8	13.2	6.0	.39	17.9	100+	7.3	.27
C.	52–58+	0.5	35.6	36.9	27.5	10.6	4.6	.35	13.6	100+	7.3	.24

[a] Iroquois County, T.26N, R.14W, Sec. 4, SW ¼, NW 40, SW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.

Representative profile, Alexis silt loam



A_p (0-8″) — A_p. Very dark grayish-brown to dark brown (10YR 2/3-3/3) friable silt loam; weak, fine crumb structure; strongly acid; abrupt smooth boundary; A_1 is 6 to 12 inches thick.

A_3 (8-14″) — A_3. Dark yellowish-brown to dark brown (10YR 3/4-7.5YR 3/4) friable silt loam to loam; weak, fine crumb to very weak, fine subangular blocky structure; strongly acid; clear smooth boundary; 3 to 6 inches thick.

B_1 (14-20″) — B_1. Dark brown (7.5YR 3/4-4/4) slightly firm silty clay loam to clay loam; weak, fine subangular blocky structure; strongly acid; gradual smooth boundary; 3 to 6 inches thick.

B_2 (20-35″) — B_2. Brown to strong brown (7.5YR 4/4-4/5) moderately firm clay loam with a few small pebbles; moderate, medium subangular blocky structure; strongly acid; gradual smooth boundary; 12 to 20 inches thick.

B_3 (35-45″) — B_3. Dark grayish-brown (10YR 4/2) mottled with yellowish-brown (10YR 5/4); friable loam or silt loam to sandy loam with some fine gravel; weak medium subangular blocky structure; medium acid; clear smooth boundary; 4 to 10 inches thick.

C (45-60″+) — C. Dark gray and grayish-brown (10YR 4/1 and 5/2) mottled with brown (7.5YR 4/5); friable stratified loam, silt loam, sandy loam, and fine gravelly loam (or in some places loose sand or gravel in the lower part); massive; weakly alkaline in upper part to calcareous in lower part.

Alexis silt loam (80)

Alexis silt loam is a dark, well-oxidized soil formed in medium-textured outwash sediments 4 or more feet deep. It developed under tall-grass prairie vegetation on gently to moderately rolling areas (1 to 6 percent slopes) in association with Proctor, Brenton, and Drummer soils. It is found along drainageways, mostly in the central part of the county. It is classed as a Brunizem soil. A representative profile is described on page 26.

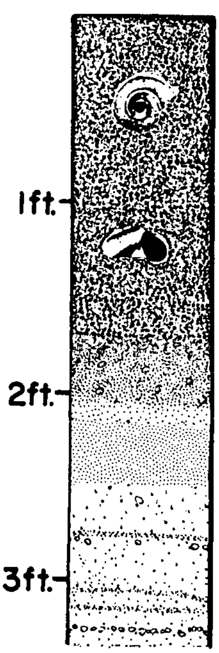
Alexis is moderately high in organic matter, medium to strongly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is moderately high and the soil is permeable. Erosion is a problem on slopes greater than 2 or 3 percent. Productivity is moderately high to high where the soil is properly fertilized and otherwise well managed (Table 30). Some eroded areas are better suited to small grains or legume hay and pasture crops than to corn and soybeans.

Millington loam (82)

Millington loam is a very dark, poorly oxidized soil formed in medium-textured alluvial sediments that were originally calcareous or accumulated large amounts of snail shells and shell fragments during deposition. Native vegetation was slough-grass and other marsh plants. The soil occupies some of the wettest portions of Du Page and Des Plaines river bottoms. It is classed as an Alluvial soil.

Millington is high to very high in organic matter, calcareous, and low in available phosphorus and potassium. Drainage is needed for the best growth of most crop plants but is difficult to provide. Productivity is high where the soil is adequately drained and fertilized and otherwise well managed (Table 30). Most of the areas are small and subject to flooding, however, and their best use may be for pasture or as habitat for wild game. Limestone should not be applied to this calcareous soil, and rock phosphate is relatively ineffective.

Representative profile, Millington loam



A_1 (0-20″) — A_1. Black (10YR 1/1-2/1) friable mucky loam or silt loam to silty clay loam, usually with abundant white (10YR 8/1) snail shells and shell fragments; moderate, medium crumb structure; calcareous; gradual smooth boundary; 10 to 40″ or more thick.

A_3 (20-40″+) — A_3. Very dark gray to very dark brown (10YR 3/1-2/2) friable loam, silt loam, sandy loam, clay loam, or silty clay loam, with abundant white snail shells and shell fragments; stratified; massive; calcareous.

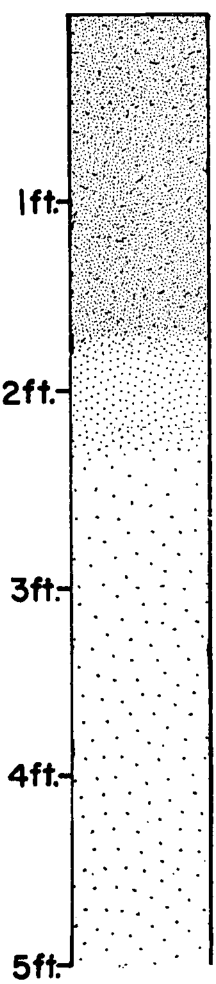
No C horizon is described in this profile. Where one is important or occurs above a 40-inch depth, it is usually a dark gray (N 4/0) to light gray (N 7/0) mass of snail shells and shell fragments mixed with silt loam to silty clay loam soil material.

Hagener loamy sand (88)

Hagener loamy sand is a dark, weakly developed, well-oxidized Brunizem soil. It formed under prairie vegetation from sands originally deposited by Kankakee torrent waters and later reworked by wind (*5*). It occupies gently to strongly sloping knolls and ridges (1 to 18 percent gradient), primarily in the southwestern part of the county. It occurs in association with Watseka, Maumee, and Pittwood. Some physical and chemical properties of a Hagener soil are given in Table 10.

Hagener is medium acid, low to medium in plant nutrients, and drouthy. Where not protected, it is subject to wind erosion. Productivity is low to medium for the important corn belt crops (Table 30), but is usually more satisfactory for early-maturing small grains such as wheat and rye, or for drouth-resistant crops such as melons, cowpeas, and alfalfa. Strip-planting sod crops with clean-tilled crops is recommended. To be effective, the strips should be approximately north-south, or at right angles to the prevailing wind, and should be no more than 20 rods wide. Red, white, and jack pine usually make satisfactory growth on sandy soils such as Hagener.

Representative profile, Hagener loamy sand



A_{1-1} (0-20″) — A_{1-1}. Very dark brown (7.5YR 2/2) loose loamy sand to loamy fine sand; single grain; medium acid; gradual smooth boundary; 12 to 40 inches or more thick.

A_{1-2} (20-26″) — A_{1-2}. Dark brown (7.5YR 3/2) loose loamy sand to loamy fine sand; single grain; medium acid; diffuse smooth boundary; 0 to 20 inches thick.

A_{3-1} (26-44″) — A_{3-1}. Dark yellowish-brown to yellowish-brown (10YR 4/4-5/4) loose sand to fine sand; single grain; medium acid; diffuse smooth boundary; 10 to 30 inches thick.

A_{3-2} (44-60″+) — A_{3-2}. Dark yellowish-brown (10YR 4/5) loose sand to fine sand; single grain; slightly acid; usually extends below 60-inch depth.

Usually at 60 to 80 inches, or sometimes deeper, is yellowish-brown (10YR 5/4) loose sand or fine sand interlayered with thin bands or lamellae of brown (7.5YR 4/4) loamy fine sand or fine sandy loam.

Table 10. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF HAGENER LOAMY SAND[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–16	1.0	84.3	9.1	6.6	4.1	0.3	0.2	8.2	57	6.0	0.42
A_{3-1}....	16–26	1.0	84.1	9.4	6.5	2.6	0.3	0.1	5.8	53	5.8	0.19
A_{3-2}....	26–34	1.0	85.9	8.4	5.7	2.5	0.3	0.1	5.4	56	5.8	0.12
A_{3-3}....	34–80	4.0	93.1	3.1	3.8	1.7	0.2	0.1	3.3	64	5.8	0.01

[a] Lawrence County, T.3N, R.11W, Sec. 10, NW ¼, SW 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0-.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.

Many areas mapped Hagener loamy sand in Will county are more nearly loamy fine sand in texture. Also some areas have clay-iron banding between depths of 40 and 60 inches. After the Will county soil map was printed, these latter areas were found to correlate as Ade, a somewhat less drouthy soil than Hagener.

Maumee fine sandy loam (89)

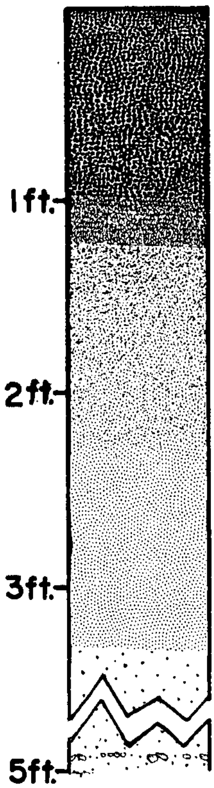
Maumee fine sandy loam is a very dark, poorly oxidized soil. It formed under wet prairie or marsh vegetation from water-deposited sand and fine sand. It occupies nearly level to depressional areas, principally south and west of Kankakee river, in the southwestern part of Will county. It occurs in association with Watseka, Pittwood, and Oquawka. It is classed as a Humic-Gley soil.

Maumee is slightly acid to neutral and is low in available phosphorus and available potassium. It needs draining to grow grain crops but can be over-drained. For most crops, the water table should be maintained at a depth of 2 to 3 feet during the growing season. Even when the soil is drained, the water table is often at or above the surface in winter and spring. Productivity is medium to high for corn when the soil is given proper treatment, but may be low for the small grains and alfalfa (Table 30).

Where Maumee borders Pittwood or Ridgeville soils, a weak B horizon may be present.

Undrained areas of Maumee fine sandy loam usually dry out too late in the season to be farmed. When Maumee is drained, however, care must be exercised to avoid lowering the water table so much that the soil becomes drouthy. (Fig. 13)

Representative profile, Maumee fine sandy loam



A_{1-1} (0-11″)

A_{1-1}. Black (10YR 2/1) very friable fine sandy loam; weak, fine crumb structure; slightly acid; gradual smooth boundary; 10 to 20 inches thick.

A_{1-2} (11-15″)

A_{1-2}. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) very friable fine sandy loam; weak, fine crumb structure to single grain; neutral; gradual smooth boundary; 0 to 10 inches thick.

A_3 (15-26″)

A_3. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) mottled with dark yellowish-brown (10YR 4/4); very friable to loose loamy fine sand; very weak, fine crumb structure to single grain; neutral; gradual smooth boundary; 5 to 15 inches thick.

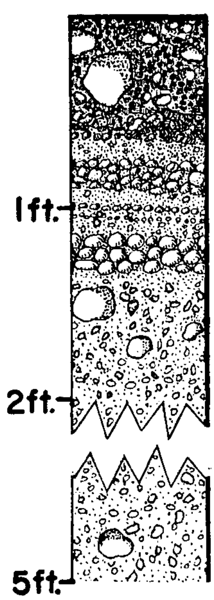
C_1 (26-40″)

C_1. Dark gray (10YR 4/1), mottled with dark yellowish-brown (10YR 4/4); loose fine sand; single grain; mildly alkaline; gradual smooth boundary; 0 to 20 inches or more thick.

C_2 (40-60″+)

C_2. Stratified gray (10YR 5/1-2.5Y 5/1) with streaks and mottles of yellowish-brown (10YR 5/4) and gray (N 5/0); loose sand or fine sand with strata containing some fine gravel at depths of 50 to 60 inches; single grain; calcareous.

Representative profile, Rodman gravelly loam



A_1 (0-7″)

A_1. Dark brown (7.5YR 3/2) friable gravelly loam; weak, medium crumb to granular structure between gravels; calcareous; abrupt irregular boundary; 4 to 10 inches thick.

C (7-40″+)

C. Varicolored gravels mostly ½ to 6 inches in diameter, usually more than 60 percent limestone, dolomite, or both; some sand and finer material; calcareous.

Rodman gravelly loam (93)

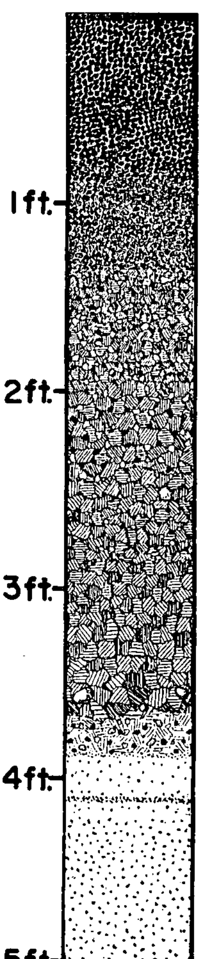
Rodman gravelly loam is a moderately dark, well-oxidized soil. It formed under forest or mixed prairie-forest vegetation from very gravelly material. It occupies a few gravelly knolls in Warsaw and Lorenzo soil areas but occurs primarily on steep slopes in association with Warsaw, Lorenzo, and Fox. It is classed as a Regosol but may be an intergrade to Brown Forest soils. A representative profile is described on page 30.

Rodman is calcareous and low in available phosphorus and available potassium. It is drouthy, with very low water-holding capacity and very rapid permeability. Productivity is low (Table 30).

LaHogue loam (102)

LaHogue loam is a very dark, imperfectly oxidized Brunizem soil. It formed under prairie vegetation from 40 to 60 inches of water-deposited loam and silt loam material on loose loamy sand or sand. It occupies nearly level areas primarily in the Kankakee

Representative profile, LaHogue loam



A_1 (0-10″)

A_1. Black (10YR 2/1) friable loam; moderate, fine to medium crumb to granular structure; very slightly acid to neutral; clear smooth boundary; 8 to 14 inches thick.

A_3 (10-16″)

A_3. Very dark gray (10YR 3/1) friable loam borderline to clay loam; weak to moderate, medium granular to very fine subangular blocky structure; very slightly acid to neutral; clear smooth boundary; 4 to 8 inches thick.

B_1 (16-20″)

B_1. Very dark brown (10YR 2/2) mottled with yellowish-brown (10YR 5/4); slightly firm light clay loam; weak to moderate, fine subangular blocky structure; very slightly acid to neutral; clear smooth boundary; 3 to 6 inches thick.

B_2 (20-33″)

B_2. Very dark gray to dark grayish-brown (10YR 3/1 to 4/2) mottled with yellowish brown (10YR 5/4 to 5/8); firm clay loam; weak to moderate, fine to medium subangular blocky structure with thin, patchy clay films; very slightly acid to neutral; clear smooth boundary; 10 to 20 inches thick.

B_3 (33-44″)

B_3. Dark gray, pale brown, and yellowish-brown (10YR 4/1, 6/3, and 5/4 to 5/8) slightly firm, light clay loam to loam or sandy clay loam; very weak, medium subangular blocky structure; neutral; abrupt smooth boundary; 3 to 15 inches thick.

C (44-60″+)

C. Gray to grayish-brown (2.5Y 5/1 to 5/2) mottled with yellowish-brown (10YR 5/4 to 5/8); loose loamy sand to fine sand; single grain; neutral.

river torrent area in the southwestern part of Will county. It occurs in association with Drummer, Brenton, Ridgeville, and Watseka.

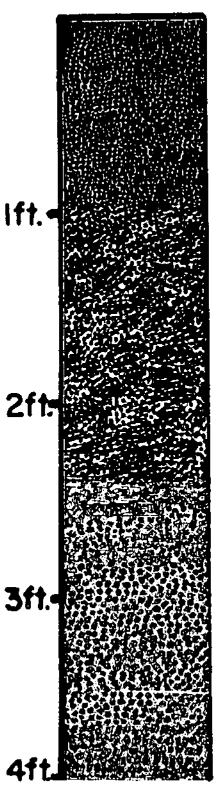
LaHogue is slightly acid to neutral, high in organic matter, low in available phosphorus, and about medium in available potassium. Some drainage is needed, but tile should be kept above any loose underlying sand. Water-holding capacity is high in the upper 3- to 4-foot section but low in the loose sand although the water table is frequently within the sand. Productivity is high when the soil is properly drained, fertilized, and otherwise well managed (Table 30).

Houghton muck (103)

Houghton muck is a very dark, very poorly oxidized organic soil. It formed in depressions through decomposition of fibrous peat, which was made up of the remains of sedges, rushes, reeds, and grasses (Fig. 14). Several important areas occur in the northern and eastern parts of Will county in association with Drummer, Ashkum, Bryce, and other soils. Houghton is classed as a Bog soil.

This type is very slightly acid to neutral, very high in organic matter, and low in available phosphorus and available potassium. Drainage is needed for satisfactory production of grain or vegetable crops. Tile will get out of line and not function properly unless placed on a firm foundation. Open ditches or furrows usually prove satisfactory. Permeability is moderate and water-holding capacity is high. Productivity for corn (Table 30) and certain vegetable crops is high when the soil is properly drained, fertilized, and otherwise well managed.

Representative profile, Houghton muck



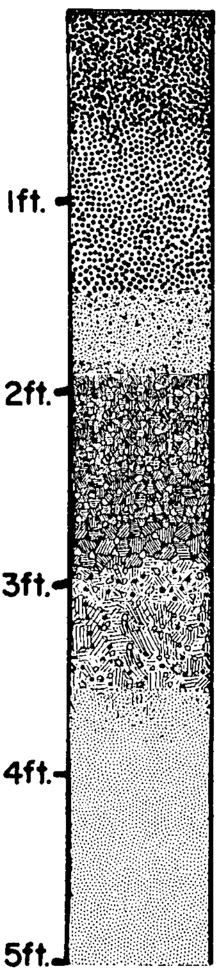
A_1 (0-12″) — A_1. Black (10YR 1/1 to 2/1) friable muck; moderate, medium crumb to granular structure; neutral; gradual smooth boundary; 10 to 30 inches or more thick.

A_3 (12-30″) — A_3. Black (N 2/0) friable muck with a few small pieces of plant remains in lower part; massive; neutral; clear, smooth boundary; 0 to 20 inches or more thick.

C (30-50″+) — C. Dark brown (7.5YR 3/4 to 4/4) fibrous peat; massive; neutral.

Certain sedges, reeds, grasses, and rushes gradually encroach on the edges of shallow lakes until the plant remains fill the lake basin with peat, which in turn decays to form muck. (Fig. 14)

Representative profile, Pittwood fine sandy loam



A_1 (0-7″)
A_1. Black (10YR 2/1) friable fine sandy loam; very weak, fine to medium crumb structure; neutral; abrupt smooth boundary; 6 to 12 inches thick.

A_{3-1} (7-17″)
A_{3-1}. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) very friable to loose fine sandy loam to loamy fine sand; very weak, fine crumb structure to single grain; slightly acid; clear smooth boundary; 5 to 15 inches thick.

A_{3-2} (17-22″)
A_{3-2}. Gray to grayish-brown (10YR 5/1-5/2) very friable to loose loamy fine sand; single grain; slightly acid; clear smooth boundary; 0 to 10 inches thick.

B_2 (22-33″)
B_2. Dark gray (10YR 4/1) mottled with yellowish-brown (10YR 5/6); slightly firm clay loam to fine sandy clay loam; weak, fine to medium subangular blocky structure; medium acid; clear smooth boundary; 10 to 20 inches thick.

B_3 (33-42″)
B_3. Dark gray (10YR 4/1) mottled with yellowish-brown (10YR 5/4); very friable fine sandy loam to loamy fine sand; single grain; slightly acid; clear smooth boundary; 3 to 10 inches thick.

C (42-50″+)
C. Gray (10YR 5/1) with few fine faint yellowish-brown (10YR 5/4) mottles; loose fine sand; neutral to mildly alkaline.

Pittwood fine sandy loam (130)

Pittwood fine sandy loam is a dark, poorly oxidized soil. It formed in sandy water-deposited sediments under marsh or wet prairie vegetation. It occupies nearly level to slightly depressional areas (less than 1 percent slope). It occurs primarily in the southwestern part of the county and is associated with Watseka, Ridgeville, and other sandy soils. It is classed as a Humic-Gley soil. A representative profile is described on page 33.

Pittwood is neutral to slightly acid, medium to high in organic matter, low in available phosphorus, and about medium in available potassium. Water table is high except where lowered by artificial drainage. Productivity is moderately high (Table 30), but the high water table often damages fall-seeded crops, such as wheat, and perennial legumes, such as alfalfa.

Portions of some of the areas mapped Pittwood have slight to no B horizon, particularly where bordering areas of Maumee.

Alvin fine sandy loam (131)

Alvin fine sandy loam is a light-colored, well-oxidized soil. It formed under deciduous hardwood forest from water-deposited sand and fine sand, some of which was moved by the wind. It occupies gently rolling to moderately rolling knolls and ridges (1 to 6 percent slopes) primarily along Kankakee river. It occurs in association with Woodland, Plainfield, and other sandy soils. It is classed as a Gray-Brown Podzolic soil. Some physical and chemical properties of an Alvin soil are given in Table 11.

Where farmed and untreated, Alvin is strongly acid, low in organic matter, low in available phosphorus, low to medium in available potassium, and moderately drouthy. Water-holding capacity is medium in the B horizon but low in the C or underlying loose sand. Productivity is low to medium unless the soil is limed and fertilized (Table 30). Rye, melons, cowpeas, and alfalfa are, in general, more productive than corn and soybeans. Clean-tilled crops should be strip-planted with sod crops to reduce blowing of the surface sands. Crop residues or other organic materials should be returned regularly. Red, white, or jack pine should make satisfactory growth on Alvin fine sandy loam.

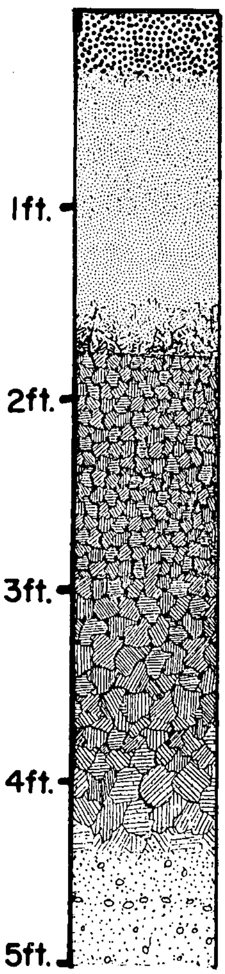
Table 11. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF ALVIN FINE SANDY LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p	0–6	0.0	67.0	27.7	5.3	2.9	1.8	0.1	7.5	64	6.8	.61
A_{2-1}	6–11	0.0	65.4	29.2	5.4	1.2	0.9	0.1	5.3	40	5.8	.18
A_{2-2}	11–16	0.0	64.8	28.0	7.2	1.7	0.7	0.1	5.3	45	5.4	.08
B_1	16–20	0.0	65.5	22.9	11.6	3.2	1.2	0.1	8.7	52	5.3	.10
B_{2-1}	20–27	0.0	67.7	15.8	16.5	3.9	2.6	0.2	12.8	54	5.0	.09
B_{2-2}	27–35	0.0	75.1	9.5	15.4	4.0	3.7	0.1	13.0	61	5.0	.05
B_{2-3}	35–44	0.0	77.1	9.8	13.1	3.2	3.2	0.2	10.6	62	4.8	.03
B_3	44–50	0.0	77.8	10.7	11.5	2.7	2.9	0.2	10.2	57	4.8	.03
C	50–65	0.0	82.1	10.1	7.8	2.0	1.9	0.2	7.4	56	5.0	.07

[a] Will County, T.32N, R.10E, Sec. 7, NE ¼, NW 40, NW 10.

[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.

Representative profile, Alvin fine sandy loam



A_1 (0-4″) — A_1. Very dark gray (10YR 3/1) very friable fine sandy loam; weak, fine crumb structure; slightly acid; abrupt smooth boundary; 1 to 5 inches thick.

A_{2-1} (4-13″) — A_{2-1}. Dark grayish-brown (10YR 4/2) very friable to loose fine sandy loam; weak, fine platy structure in place, breaking to very weak, fine crumb to single grain; strongly acid; clear smooth boundary; 6 to 14 inches thick.

A_{2-2} (13-18″) — A_{2-2}. Brown to pale brown (10YR 5/3-6/3) very friable to loose fine sandy loam to loamy fine sand; very weak platy structure breaking to very weak crumb to single grain; strongly acid; clear smooth boundary; 0 to 10 inches thick. In some areas a weak subangular blocky A_3 occurs at this depth.

B_1 (18-21″) — B_1. Pale brown (10YR 6/3) very friable fine sandy loam; weak, fine to medium subangular blocky structure; strongly acid; clear smooth boundary; 2 to 5 inches thick.

B_2 (21-35″) — B_2. Yellowish-brown (10YR 5/6) to strong brown (7.5YR 4/5) fine sandy clay loam; weak, fine to medium subangular blocky structure with some thin discontinuous dark brown (7.5YR 3/2) coatings; strongly acid; clear smooth boundary; 10 to 18 inches thick.

B_3 (35-53″) — B_3. Strong brown (7.5YR 4/5) fine sandy clay loam to fine sandy loam; weak, medium subangular blocky structure with a few thin discontinuous dark brown (7.5YR 3/2) coatings; strongly acid; clear smooth boundary; 5 to 20 inches thick.

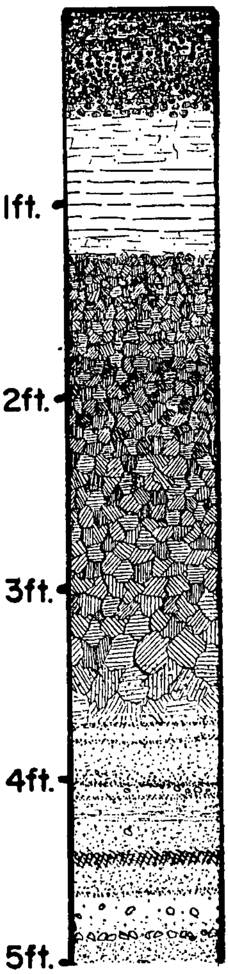
C (53-60″+) — C. Yellowish-brown (10YR 5/4) loose loamy fine sand with some fine gravel; single grain; slightly acid at depths of 5 feet; calcareous at 6 feet in the profile described.

Starks silt loam (132)

Starks silt loam is a light-colored, imperfectly oxidized Gray-Brown Podzolic soil formed in 1½ to 3 feet of silty material on stratified, medium-textured outwash. The solum is usually somewhat thicker than 3½ feet. The soil developed under forest vegetation on nearly level to very gently sloping areas (slopes of 1 percent or less). It occurs in various parts of the county on stream terraces or small outwash plains in association with Camden, Alvin, and Woodland.

Starks is low in organic matter, medium to strongly acid, low to medium in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. Drainage is needed. Productivity is low unless the soil is well managed, but response to fertilization is high. See Table 30 for estimated yields under good management.

Representative profile, Starks silt loam



A_p (0-7″)

A_p. Dark gray (10YR 4/1) friable silt loam; weak, fine to medium granular structure; medium acid; abrupt smooth boundary; A_1 varies from 2 to 5 inches in thickness.

A_2 (7-15″)

A_2. Gray (10YR 5/1) very friable silt loam; weak, fine platy structure; strongly acid; clear smooth boundary; 6 to 14 inches thick.

B_1 (15-17″)

B_1. Grayish-brown (2.5Y 5/2) light silty clay loam with a few fine dark brown (10YR 4/3) mottles; weak, fine subangular blocky structure; strongly acid; clear smooth boundary; 0 to 4 inches thick.

B_{2-1} (17-27″)

B_{2-1}. Gray (5Y 5/1) heavy silty clay loam with moderate, medium, yellowish-brown (10YR 5/4) and dark brown (7.5YR 4/4) mottles; moderate, medium subangular blocky structure; strongly acid; gradual smooth boundary; 5 to 15 inches thick.

B_{2-2} (27-39″)

B_{2-2}. Mixed grayish-brown (2.5Y 5/2) and dark grayish-brown (2.5Y 4/2) clay loam; moderate, medium to coarse subangular blocky structure; medium acid; gradual smooth boundary; 5 to 15 inches thick.

B_3 (39-44″)

B_3. Grayish-brown (2.5Y 5/2) and dark grayish-brown (10YR 4/2) stratified clay loam and sandy clay loam; weak, coarse subangular blocky structure; slightly acid; abrupt smooth boundary; 3 to 10 inches thick.

C (44-60″+)

C. Mixed brown (10YR 5/3), dark yellowish-brown (10YR 4/4), and grayish-brown (2.5Y 5/2) stratified loam, silt loam, sandy loam, and sandy clay loam; neutral. In some areas the material at a depth of 4 to 5 feet is more gravelly than described here and may also be calcareous.

Table 12. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF CAMDEN SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–4	...[c]	....	....	....	....	...	...	....	..	...	....
A_2......	4–12	0.0	5.2	75.2	19.6	7.9	2.8	.8	17.8	65	6.1	1.10
B_1......	12–18	...	....	....	....	....	...	...	....	..	...	....
B_{2-1}....	18–24	0.0	3.7	63.3	33.0	14.7	6.6	.5	30.4	72	5.4	.19
B_{2-2}....	24–31	0.0	3.3	62.7	34.0	13.4	5.7	.7	30.1	66	5.2	.20
B_{2-3}....	31–37	0.0	7.5	60.2	32.3	14.4	6.0	.6	30.0	68	5.0	.07
C......	44–50	0.0	11.1	64.4	24.5	9.2	4.0	.5	21.3	64	5.2	.09

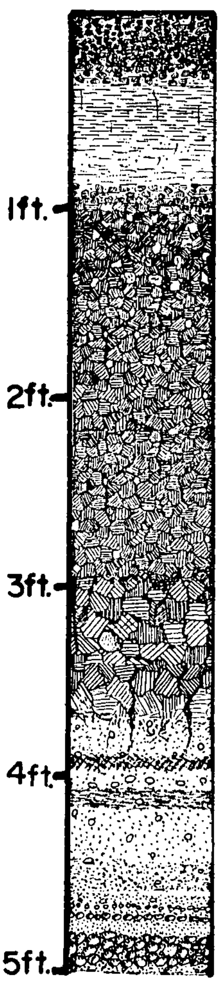
[a] McHenry County, T.45N, R.5E, Sec. 7, NE ¼, NE 40, SE 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Camden silt loam (134)

Camden silt loam is a light-colored, well- to moderately well-oxidized Gray-Brown Podzolic soil formed in 1½ to 3 feet of silty material on stratified, medium-textured outwash. The solum is thicker than 3½ feet. Camden developed under forest vegetation on nearly level to strongly rolling topography (slopes 0 to 15 percent). It occurs on outwash plains and terraces along the larger streams in association with Starks, Alvin, and Woodland. Some physical and chemical properties of a Camden soil are given in Table 12.

Camden is low in organic matter, medium to strongly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. Natural water table is deep and drainage is not needed. Erosion is a problem on slopes greater than 3 or 4 percent. Productivity is low unless the soil is fertilized and otherwise well managed (Table 30).

Representative profile, Camden silt loam



A$_1$ (0-4″)

A$_1$. Very dark grayish-brown (10YR 3/2) friable silt loam; moderate, fine to medium crumb structure; medium acid; clear smooth boundary; 1 to 5 inches thick.

A$_2$ (4-13″)

A$_2$. Brown to yellowish-brown (10YR 5/3-5/4) very friable silt loam; weak, fine platy structure in place in upper part, to weak very fine subangular blocky in lower part; strongly acid; clear smooth boundary; 6 to 12 inches thick.

B$_1$ (13-16″)

B$_1$. Brown to yellowish-brown (7.5YR 5/5 to 10YR 5/5) light silty clay loam; moderate, fine subangular blocky structure with thin patchy very pale brown coatings; strongly acid; clear smooth boundary; 2 to 6 inches thick.

B$_{2-1}$ (16-23″)

B$_{2-1}$. Brown to yellowish-brown (7.5YR 4/4 to 10YR 5/4-5/6) firm silty clay loam with some sand grains in lower part; moderate, fine to medium subangular blocky structure; strongly acid; gradual smooth boundary; 5 to 10 inches thick.

B$_{2-2}$ (23-36″)

B$_{2-2}$. Brown to yellowish-brown (7.5YR 4/4 to 10YR 5/4) firm silty clay loam with some sand grains; moderate, medium subangular blocky structure; medium acid; gradual smooth boundary; 10 to 15 inches thick.

B$_3$ (36-44″)

B$_3$. Brown to yellowish-brown (7.5YR 4/4 to 10YR 5/6) firm clay loam to gritty silty clay loam; weak, medium to coarse subangular blocky structure with splotches of very dark brown on aggregate faces; slightly acid; clear wavy boundary; 6 to 15 inches thick.

C (44-60″+)

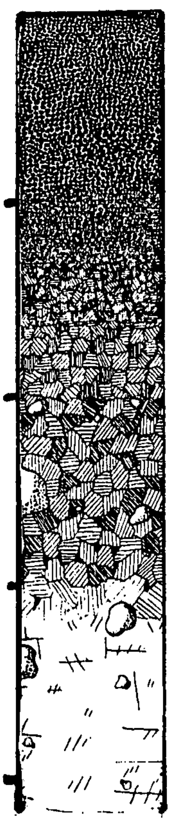
C. Mostly brown (7.5YR 5/4), sometimes spotted with very dark brown and light brownish-gray (10YR 2/2 and 6/2); stratified sandy loam, loam, and silt loam with thin lenses of sand or fine gravel; slightly acid to neutral.

In most areas a brown (7.5YR 4/4) to dark reddish-brown (5YR 3/3) sticky clayey layer known as a "Beta" horizon (*2*) occurs just above calcareous coarse-textured material. This horizon is usually deeper than 60 inches in Camden but is slightly shallower in a few areas in Will county.

Saybrook silt loam (145)

Saybrook silt loam is a dark, moderately well- to well-oxidized Brunizem soil formed in 1½ to 3 feet of silty material, chiefly loess, on loam to silt loam glacial till. The solum is between 24 and 42 inches thick. This type developed under prairie vegeta-

Representative profile, Saybrook silt loam



A_1 (0-11″)

A_1. Black to very dark brown (10YR 2/1-2/2) friable silt loam; moderate, medium crumb structure; medium acid; clear smooth boundary; 8 to 14 inches thick.

A_3 (11-17″)

A_3. Very dark grayish-brown to dark brown (10YR 3/2-3/3) friable silt loam borderline to silty clay loam; moderate, medium crumb to granular structure; medium acid; clear smooth boundary; 3 to 8 inches thick.

B_1 (17-20″)

B_1. Brown (10YR 4/3-5/3) moderately firm silty clay loam borderline to silt loam; moderate, fine subangular blocky structure; medium acid; clear smooth boundary; 2 to 6 inches thick.

B_2 (20-31″)

B_2. Brown (10YR 4/3-5/3) mottled with dark brown (7.5YR 4/4) and dark yellowish-brown (10YR 4/4); firm silty clay loam; moderate, medium subangular blocky structure; medium acid; abrupt smooth boundary; 10 to 16 inches thick.

IIB_3 (31-35″)

IIB_3. Brown to light yellowish-brown (10YR 5/3-6/4) mottled with yellowish-brown to brownish-yellow (10YR 5/8-6/8); firm clay loam to gritty silty clay loam; moderate, medium subangular blocky structure with some dark gray (10YR 4/1) organic-clay coatings; slightly acid; clear smooth boundary; 3 to 6 inches thick.

IIC (35-50″+)

IIC. Brown and yellowish-brown to olive brown (10YR 5/3-5/4 to 2.5Y 4/4) moderately firm loam to silt loam; massive; calcareous. Content of clay less than 2 microns in diameter ranges between about 15 and 27% in the calcareous till.

Table 13. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF SAYBROOK SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–14	...[c]	9.5	59.9	30.6	16.1	8.0	.2	27.1	90	7.6	2.4
A_3–B_1...	14–19	...	9.0	55.6	35.4	12.1	7.9	.3	24.6	83	7.1	1.0
B_2......	19–30	...	14.4	48.7	36.9	9.7	6.8	.2	21.4	78	6.7	.6
IIC....	30–40	...	22.6	62.9	14.5	20.9	4.5	.1	25.5	100	8.1	.9

[a] Will County, T.37N, R.9E, Sec. 18, NW ¼, SE 40, SE 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm. Particle size distribution indicates that A_1 horizon has silty clay loam texture.
[c] Not determined.

tion on gently to moderately rolling areas (slopes 2 to 15 percent). It occurs in the northwestern part of the county in association with Lisbon and Drummer. Some physical and chemical properties of a Saybrook soil are given in Table 13.

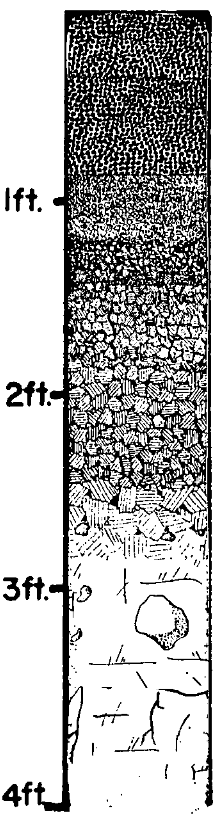
Saybrook is high in organic matter, about medium acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high and permeability is moderate. Erosion is a hazard under intensive cultivation and poor management. Productivity is high under good management if the soil has not been severely eroded (Table 30).

Elliott silt loam (146)

Elliott silt loam is a dark, imperfectly oxidized Brunizem soil formed in silty clay loam till with less than 2 feet of medium-textured surficial drift (including loess). It developed under prairie vegetation on gently to moderately rolling areas (1 to 6 percent slopes). It occurs throughout most of the county in association with Ashkum and Beecher. Some physical and chemical properties of an Elliott soil are given in Table 14.

Elliott is high in organic matter, medium acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high but permeability in the lower solum and underlying till is slow. Drainage is needed in some of the more level areas. Tile function slowly but are generally effective. Erosion is a problem on slopes greater than 2 or 3 percent, particularly under intensive cultivation.

Representative profile, Elliott silt loam



A_1 (0-10″)

A_3 (10-15″)

(15-17″)

B_2 (17-27″)

B_3 (27-30″)

C (30-50″+)

A_1. Black to very dark gray (10YR 2/1-3/1) friable silt loam to silty clay loam; moderate, fine crumb to granular structure; medium to slightly acid; gradual smooth boundary; 8 to 16 inches thick.

A_3. Very dark gray to dark grayish-brown (10YR 3/1-4/2) friable silt loam borderline to silty clay loam; moderate, coarse granular to very fine subangular blocky structure; medium acid; gradual smooth boundary; 3 to 6 inches thick.

B_1. Dark grayish-brown (10YR 4/2) mottled with brown to yellowish-brown (10YR 5/3, 5/4, 5/6); moderately firm silty clay loam borderline to silt loam; moderate, fine subangular blocky structure; medium acid; clear smooth boundary; 0 to 6 inches thick.

B_2. Mixed brown, yellowish-brown, and olive brown (10YR 4/3, 5/3, 5/4 and 2.5Y 4/3, 4/4) firm silty clay loam to silty clay; moderate to strong, medium subangular blocky structure; medium to slightly acid; clear smooth boundary; 10 to 15 inches thick.

B_3. Mixed brown, yellowish-brown, and light olive brown (10YR 4/3, 5/4 and 2.5Y 5/4) mottled with dark grayish-brown (2.5Y 4/2); very firm silty clay; strong, subangular blocky structure with organic-clay coatings; neutral; clear smooth boundary; 0 to 4 inches thick.

C. Dark gray, yellowish-brown and light olive brown (10YR 4/1, 5/4 and 2.5Y 5/4), with seams of light gray to white (10YR 7/2-8/2) secondary lime in upper part; firm silty clay loam; medium irregular blocky structure to massive; calcareous. Content of clay <2 microns in diameter ranges from 25 to 36% (Table 25). Portions of the Elliott soil areas as mapped in Will county are better oxidized and have a more brownish B horizon than described here.

Table 14. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF ELLIOTT SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_{1-1}....	0–5	0.1	8.8	65.7	25.5	17.4	3.2	1.2	24.2	92	6.2	4.31
A_{1-2}....	5–10	0.1	8.5	64.5	27.0	16.0	2.6	.7	22.2	87	5.8	3.28
A_3......	10–14	0.2	7.9	61.7	30.4	14.6	2.3	.6	20.2	87	5.8	2.08
B_{2-1}....	14–19	0.4	8.3	53.8	37.9	13.4	3.2	.6	19.6	88	5.9	1.33
B_{2-2}....	19–24	1.2	9.4	46.3	44.3	12.9	4.4	.6	18.6	97	6.5	.88
B_3......	24–29	0.5	10.5	45.4	44.1	12.8	4.6	.5	18.4	98	7.0	.93
C......	29–48	7.4	15.2	54.2	30.6	....[c]	...	...	....	...	7.9	.57

[a] Will County, T.33N, R.9E, Sec. 1, NE ¼, NE 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm. [c] Not determined.

Productivity is moderately high to high on uneroded land which is well managed (Table 30). But corn yields have been shown to be 10 bushels an acre less where the A horizon is 4 inches thick than where it is 12 inches thick (*19*). This is an average decline of about 1.2 bushels an acre for each 1-inch decrease in depth of A horizon.

Proctor silt loam (148)

Proctor silt loam is a dark, moderately well-oxidized Brunizem soil formed in 1½ to 3 feet of silty material (including loess) on stratified, medium-textured outwash. The solum is thicker than 3½ feet. This type developed under prairie vegetation on gently rolling topography (slopes usually between 1 and 6 percent). It occurs on outwash plains and terraces along most of the streams in association with Alexis, Brenton, and Drummer. Some properties of a Proctor soil are given in Table 15, but the profile analyzed had more gravel above 60 inches than normal.

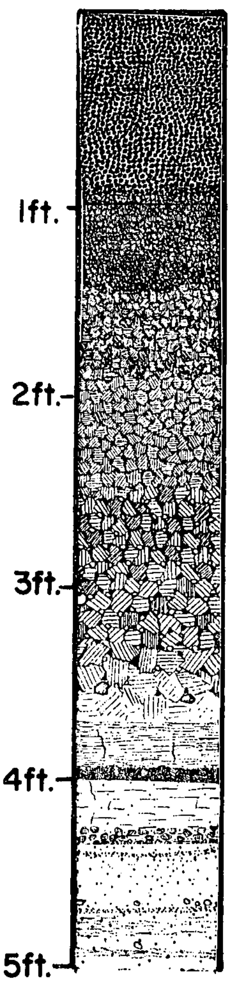
Table 15. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF PROCTOR SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_{1-1}....	0–8	....[c]	3.1	71.6	25.3	14.2	5.2	0.52	20.4	99	7.1	2.48
A_{1-2}....	8–15	....	2.8	70.5	26.7	10.7	4.9	0.29	19.3	84	6.3	1.91
A_3......	15–19	....	2.6	69.2	28.2	7.8	5.3	0.27	18.4	74	5.5	1.39
B_1......	19–24	....	2.5	66.7	30.8	8.1	6.8	0.28	19.2	81	5.4	.96
B_{2-1}....	24–32	....	2.7	65.4	31.9	7.9	8.7	0.32	20.1	86	5.4	.58
B_{2-2}....	32–41	0.2	10.5	59.4	30.1	9.4	7.0	0.36	19.0	89	5.5	.40
B_3...... (Beta)	41–48	36.3	29.7	32.4	37.9	10.8	8.4	0.38	21.6	92	6.2	.61
C......	48–60	62.0	72.6	19.8	7.6	5.5	1.9	0.10	1.9	100+	7.9	.23

[a] La Salle County, T.31N, R.4E, Sec. 13, SE ¼, NE 40, SE 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm. [c] Not determined.

Proctor is high in organic matter, medium acid, mostly low in available phosphorus, and about medium in available potassium. Water-holding capacity is moderately high to high and permeability is moderate. The natural water table usually remains below the 3-foot depth so artificial drainage is not needed. Erosion may be a problem on slopes greater than 3 or 4 percent. Productivity is high when the soil is properly fertilized and otherwise well managed (Table 30).

Representative profile, Proctor silt loam



A_1 (0-11")	A_1. Black to very dark brown (10YR 2/1 to 2/2) friable silt loam; moderate, fine crumb structure; slightly acid; gradual smooth boundary; 8 to 15 inches thick.
A_3 (11-17")	A_3. Very dark brown to very dark grayish-brown (10YR 2/2 to 3/2) friable heavy silt loam; moderate, fine granular structure; medium acid; clear wavy boundary; 3 to 8 inches thick.
B_1 (17-23")	B_1. Very dark grayish-brown to dark brown (10YR 3/2 to 3/3) slightly firm light silty clay loam; moderate, very fine subangular blocky structure; medium acid; clear wavy boundary; 3 to 6 inches thick.
B_{2-1} (23-30")	B_{2-1}. Dark brown (10YR 3/3 to 4/3) firm silty clay loam; moderate, medium subangular blocky structure; medium acid; clear smooth boundary; 5 to 10 inches thick.
B_{2-2} (30-38")	B_{2-2}. Yellowish-brown (10YR 5/4) mottled with grayish-brown (10YR 5/2); firm silty clay loam with a few sand grains; moderate, medium subangular blocky structure with thin dark brown clay films over many surfaces; medium acid; gradual smooth boundary; 6 to 12 inches thick.
B_3 (38-43")	B_3. Mixed grayish-brown (2.5Y 5/2), olive (5Y 5/4), and yellowish-brown (10YR 5/6) slightly firm, light silty clay loam with some sand and a few small pebbles; weak, medium to coarse subangular blocky structure; slightly acid; clear wavy boundary; 3 to 10 inches thick.
C_1 (43-56")	C_1. Light olive gray (5Y 6/2) to light gray (5Y to 10YR 7/2) slightly firm heavy silt loam stratified with thin layers of fine sand and clay loam containing small pebbles; massive within strata; neutral; clear smooth boundary; 0 to 20 inches or more thick.
C_2 (56-60"+)	C_2. Light brownish-gray (2.5Y 6/2) to pale brown (10YR 6/3) to light gray (10YR 7/1 to 7/2) stratified silt loam and fine to coarse sandy loam to sand; massive; calcareous.

Many Proctor soil areas in Will county contain more gravelly strata between the 40- and 60-inch depths than are described here. The data in Table 15 are from such a profile. Also, carbonates are often deeper than 60 inches and a Beta horizon (*2*) usually occurs just above coarse-textured calcareous material.

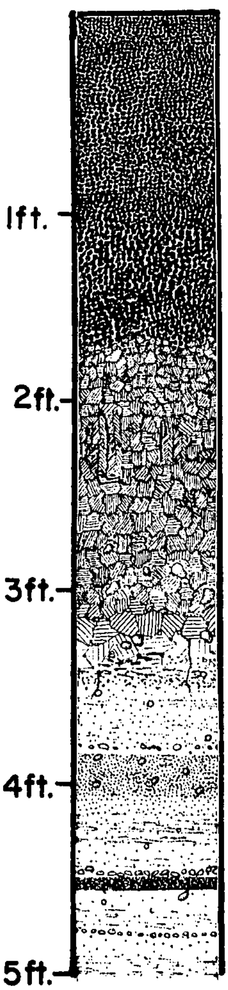
Brenton silt loam (149)

Brenton silt loam is a dark, imperfectly oxidized Brunizem soil formed in 1½ to 3 feet of silty material on stratified, medium-textured outwash. The solum is thicker than 3½ feet. Brenton developed under tall-grass prairie vegetation on nearly level to very gently sloping topography (slopes of 1½ percent or less). It occurs on out-

wash plains and terraces along most of the streams in association with Proctor, Drummer, and Millbrook.

Brenton is high in organic matter, medium to slightly acid, mostly low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. The natural water table seasonally rises to about the 2-foot depth, and drainage is needed. Productivity is high when the soil is properly fertilized and otherwise well managed (Table 30).

Representative profile, Brenton silt loam



A_1 (0-13″) — A_1. Black (10YR 2/1) friable heavy silt loam; moderate, fine to medium crumb or granular structure grading to weak, fine subangular blocky in lower part; slightly acid; gradual smooth boundary; 10 to 16 inches thick. Sometimes an A_3 or B_1 (or both) occurs between the A_1 and B_2 horizons.

B_{2-1} (13-20″) — B_{2-1}. Mixed very dark gray (10YR 3/1 to 3/1.5) and dark brown to olive brown (10YR 3/3 to 2.5Y 4/4) firm silty clay loam; moderate, fine subangular blocky structure with thin very dark gray clay coatings over most surfaces; medium to slightly acid; clear smooth boundary; 5 to 10 inches thick.

B_{2-2} (20-30″) — B_{2-2}. Dark gray to dark grayish-brown (10YR 4/1 to 4/2) mottled with yellowish-brown (10YR 5/4 to 5/6) to olive brown (2.5Y 4/4); firm silty clay loam; moderate, medium subangular blocky structure, sometimes showing weak prisms, with thin dark gray clay coatings over most surfaces; slightly acid; clear smooth boundary; 6 to 15 inches thick.

B_3 (30-40″) — B_3. Dark gray to gray (10YR 4/1 to 5/1) mottled with dark yellowish-brown to yellowish-brown (10YR 4/4 to 5/6); firm light clay loam to fine gravelly clay loam; weak, coarse blocky structure to massive; neutral; clear smooth boundary; 5 to 15 inches thick.

C_1 (40-48″) — C_1. Mixed gray, dark gray, and dark yellowish-brown (10YR 5/1, 4/1, and 4/4) stratified silt loam, sandy loam, fine gravelly sandy loam and clay loam; massive; neutral; clear smooth boundary; 0 to 20 inches thick.

C_2 (48-60″+) — C_2. Stratified brown to yellowish-brown and light gray (10YR 5/3 to 5/6 and 7/1) fine gravelly loam; yellowish-brown (10YR 5/4 to 5/6) very fine sandy loam mottled with gray; and brown (7.5YR 5/2) loam to silt loam; calcareous.

Both more and fewer gravelly strata than described here can be found in various Brenton soil areas in Will county. Also, carbonates are both shallower and deeper than 48 inches.

Ridgeville fine sandy loam (151)

Ridgeville fine sandy loam is a dark, imperfectly oxidized Brunizem soil. It formed in sandy water-deposited materials under tall-grass prairie. It occupies very gently rolling knolls and ridges (1 to 2 percent slopes) and occurs primarily in the southwestern part of the county. Some physical and chemical properties of a Ridgeville soil are given in Table 16.

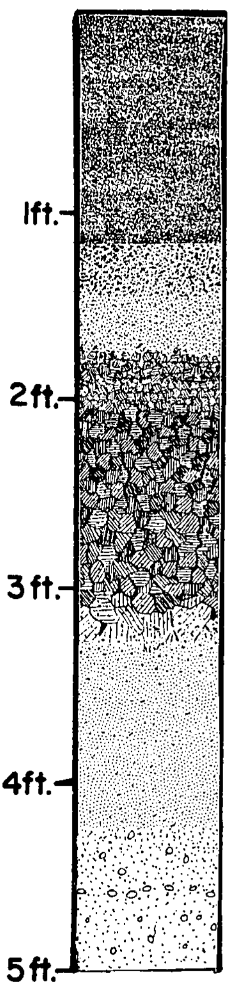
Ridgeville is medium to strongly acid, moderately high in organic matter, low in available phosphorus, and low to medium in available potassium. It is about

Table 16. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF RIDGEVILLE FINE SANDY LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_{1-1}....	0–9	0	77.1	14.4	8.5	7.2	2.6	.1	12.5	80	5.7	2.22
A_{1-2}....	9–18	0	79.5	13.1	7.4	3.6	.9	.1	8.1	59	5.1	1.33
A_3......	18–23	0	79.0	13.9	7.1	2.3	...[c]	.04	6.1	46	5.0	.64
B_1......	23–33	0	85.7	8.2	6.1	1.8	...	.03	3.8	68	5.5	.26
B_2......	33–44	0	79.3	6.8	13.9	5.1	...	.2	9.6	95	6.2	.17
B_3......	44–53	0	84.3	7.2	8.5	3.2	...	.1	4.8	100	7.3	.10

[a] Will County, T.32N, R.9E, Sec. 2, NW ¼, NW 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm.
[c] Not determined.

Representative profile, Ridgeville fine sandy loam



A_1 (0-14")

A_1. Very dark brown (10YR 2/2) very friable fine sandy loam; very weak, fine to medium crumb structure; medium acid; clear smooth boundary; 10 to 18 inches thick.

A_{3-1} (14-17")

A_{3-2} (17-21")

A_{3-1}. Very dark grayish-brown and dark grayish-brown (10YR 3/2 and 4/2) very friable fine sandy loam to loamy fine sand; very weak, fine crumb structure to single grain; strongly acid; clear wavy boundary; 3 to 5 inches thick.

A_{3-2}. Brown and yellowish-brown (10YR 5/3 and 5/4) very friable fine sandy loam to loamy fine sand; very weak, fine to medium crumb structure to single grain; strongly acid; gradual smooth boundary; 0 to 5 inches thick.

B_1 (21-25")

B_1. Pale brown (10YR 6/3) mottled with yellowish-brown (10YR 5/6); friable fine sandy loam; weak, fine to medium crumb to very weak, very fine subangular blocky structure; strongly acid; gradual smooth boundary; 3 to 6 inches thick.

B_{2-1} (25-30")

B_{2-1}. Light yellowish-brown (10YR 6/4) mottled with yellowish-brown (10YR 5/6); friable to slightly firm fine sandy loam to fine sandy clay loam; weak, fine subangular blocky structure; strongly acid; clear smooth boundary; 0 to 6 inches thick.

B_{2-2} (30-38")

B_{2-2}. Gray and yellowish-brown (10YR 5/1 and 5/6) friable to slightly firm fine sandy clay loam to clay loam; weak, fine to medium subangular blocky structure; medium acid; gradual smooth boundary; 6 to 15 inches thick.

B_3 (38-50")

B_3. Gray and yellowish-brown (10YR 6/1 and 5/4) loose loamy fine sand to fine sandy loam; single grain; neutral; abrupt smooth boundary; 5 to 15 inches thick.

C (50-60"+)

C. Gray (10YR 5/1) mottled with light gray, yellow, and yellowish-brown (10YR 7/2, 7/6, and 5/8); friable to loose loamy fine sand with some fine gravel; single grain; calcareous. Some areas of Ridgeville soil are non-calcareous to 60 inches or deeper.

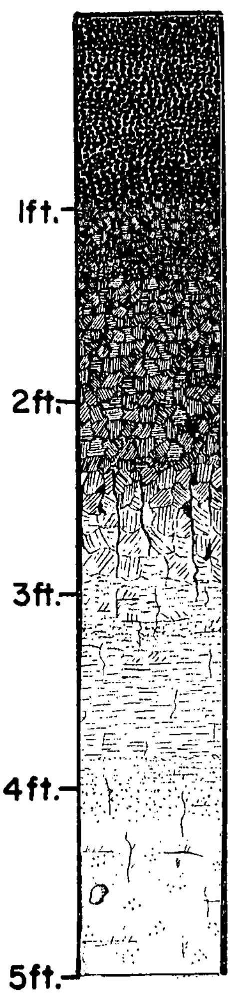
medium in water-holding capacity but tends to be somewhat drouthy when the water table drops below 4 feet. Productivity is moderately high, particularly where the soil is properly fertilized and otherwise well managed (Table 30).

Drummer silty clay loam (152)

Drummer silty clay loam is a very dark, poorly oxidized soil. The top 3½ to 4 feet of parent material is medium- to moderately fine-textured loess or silty outwash (sometimes both); the underlying material is stratified or nonstratified drift. Drummer developed under wet prairie or marsh vegetation on nearly level areas or along upland drainageways, primarily in association with Saybrook, Lisbon, and Brenton. It is classed as a Humic-Gley soil. Some physical and chemical properties of a Drummer soil are given in Table 17.

Drummer is high in organic matter, neutral to very slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. Drainage is needed and tile function well. Productivity is high where the soil is adequately drained and otherwise well managed (Table 30).

Representative profile, Drummer silty clay loam



A_1 (0-12″) — A_1. Black (10YR 1/1-2/1) moderately firm silty clay loam; moderate, medium granular structure; slightly acid; gradual smooth boundary; 10 to 16 inches thick.

A_3-B_1 (12-16″) — A_3-B_1. Very dark gray (10YR 3/1) firm silty clay loam; moderate, medium to coarse granular to very fine subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 8 inches thick.

B_2 (16-28″) — B_2. Dark gray to dark grayish-brown (2.5Y 4/1-4/2) mottled with yellowish-brown (10YR 5/4-5/6); firm silty clay loam; weak, medium subangular to angular blocky structure with some organic-clay coatings; slightly acid to neutral; gradual smooth boundary; 10 to 15 inches thick.

B_3 (28-35″) — B_3. Dark grayish-brown to grayish-brown (2.5Y 4/2-5/2) mottled with brown and yellowish-brown (10YR 5/3, 5/6-5/8); firm silty clay loam; weak, medium to coarse subangular blocky structure to massive; neutral; clear smooth boundary; 3 to 8 inches thick.

C_1 (35-50″) — C_1. Mixed gray, grayish-brown, and yellowish-brown (2.5Y 6/1, 5/2 and 10YR 5/4, 5/6, 5/8) friable to slightly firm silt loam, sometimes stratified with silty clay loam, sandy loam, or fine gravelly loam; massive; neutral to calcareous.

C_2 (50-60″+) — C_2. Mixed dark grayish-brown, dark yellowish-brown, light gray, and light olive brown (10YR 4/2, 4/4, 2.5Y 6/1-7/1 and 5/4-6/4) firm loam; massive; calcareous.

One to several krotovinas per square foot are present through the B and C horizons in most Drummer soil areas. In Will county, the material underlying Drummer sola varies from calcareous loam till to medium-textured outwash.

Table 17. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF DRUMMER SILTY CLAY LOAM[a]

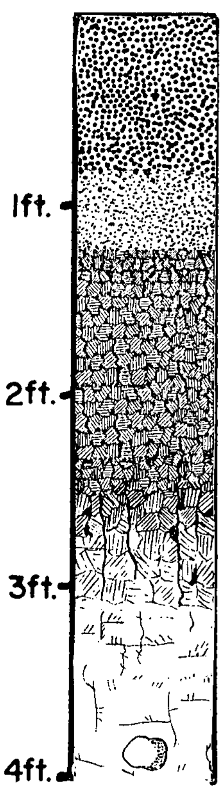
Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p	0–8	0.2	11.1	62.5	26.4	....[c]	8.1	.36	....	....	6.3	4.00
A_{1-2}	8–16	0.6	15.6	59.8	24.6	17.1	7.5	.35	24.2	100+	6.8	1.50
B_1	16–20	0.8	17.7	59.6	22.7	12.7	6.8	.30	17.5	100+	7.1	.56
B_{2-1}	20–24	0.5	14.8	61.2	24.0	13.2	6.9	.36	19.9	100+	7.2	.46
B_{2-2}	24–31	0.1	7.4	65.1	27.5	14.3	8.1	.41	21.5	100+	7.1	.37
B_{2-3}	31–41	0.0	3.2	65.2	31.6	15.9	9.0	.40	24.9	100+	7.2	.31
C	41–60	0.1	7.2	68.9	23.9	12.2	6.6	.40	17.8	100+	7.2	.28

[a] Grundy County, T.32N, R.6E, Sec. 21, NW ¼, SW 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Rankin sandy loam (157)

Rankin sandy loam is a dark, well-oxidized soil that developed under tall-grass prairie. Parent material is 20 to 42 inches of water-deposited sand and fine sand, some of which has been moved into low knolls and ridges by the wind. Underlying

Representative profile, Rankin sandy loam



A_1 (0-10″)

A_1. Very dark brown (10YR 2/2) very friable sandy loam to fine sandy loam; weak, fine crumb structure; medium acid; gradual smooth boundary; 7 to 12 inches thick.

A_3 (10-15″)

A_3. Very dark grayish-brown (10YR 3/2) very friable sandy loam to fine sandy loam; weak, fine crumb structure to single grain; medium acid; gradual smooth boundary; 3 to 8 inches thick.

B_1 (15-18″)

B_1. Dark brown (10YR 3/3-4/3) friable sandy loam to fine sandy clay loam; very weak, fine subangular blocky structure; medium acid; gradual smooth boundary; 2 to 6 inches thick.

B_{2-1} (18-28″)

B_{2-1}. Dark yellowish-brown to yellowish-brown (10YR 4/4-5/4) friable sandy clay loam to fine sandy clay loam; very weak, fine subangular blocky structure; slightly acid in upper part to neutral in lower part; abrupt smooth boundary; 8 to 14 inches thick.

IIB_{2-2} (28-30″)

IIB_{2-2}. Yellowish-brown (10YR 5/5) firm silty clay loam to silty clay; moderate, fine to medium subangular to angular blocky structure; mildly alkaline; clear smooth boundary; 2 to 6 inches thick.

IIC (30-48″+)

IIC. Light olive brown (2.5Y 5/4), mottled with gray (5Y 5/1); firm light silty clay loam; medium to coarse subangular to angular blocky structure in upper part, grading to massive in lower part; calcareous. Content of clay <2 microns in diameter ranges between about 25 and 36% in the calcareous till.

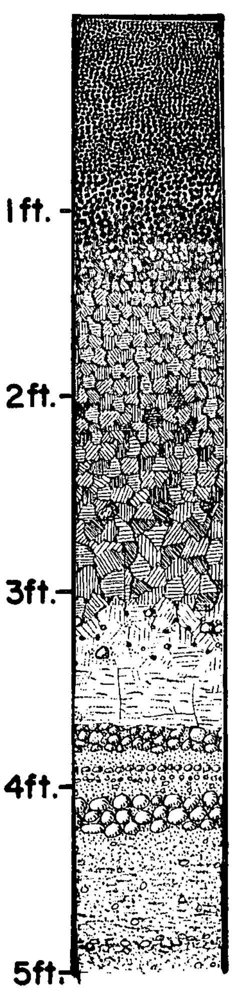
material is calcareous till or lakebed sediment of silty clay loam texture. Topography ranges from gently rolling to strongly sloping; much of this soil type lies on slopes along Horse creek south of Custer Park. Rankin is classed as a Brunizem soil.

Where farmed and untreated, Rankin is medium to strongly acid in the sandy upper solum, low in available phosphorus, and low to medium in available potassium. The underlying material contains particles and fragments of limestone but is low in phosphatic minerals. Water-holding capacity is low to medium in the sandy overburden, and high in the underlying material. Productivity is low unless lime and fertilizers are applied according to soil tests (Table 30). Crop residues or other organic materials should be returned regularly.

Martinton silt loam (189)

Martinton silt loam is a dark, imperfectly oxidized Brunizem soil formed in moderately fine water-deposited sediments. It developed under tall-grass prairie vegetation on gently sloping areas (slopes of 1 to 2 percent). It is a minor type, occurring

Representative profile, Martinton silt loam



A_1 (0-10")

A_1. Black (10YR 2/1) moderately firm silt loam borderline to silty clay loam; weak, medium crumb structure; slightly acid; gradual smooth boundary; 8 to 16 inches thick.

A_3 (10-14")

A_3. Black to very dark gray (10YR 2/1-3/1) moderately firm silty clay loam borderline to silt loam; weak to moderate, fine crumb to granular structure; slightly acid; clear smooth boundary; 3 to 6 inches thick.

B_1 (14-17")

B_1. Very dark gray (10YR 3/1) mottled with dark yellowish-brown (10YR 4/4); firm silty clay loam; weak to moderate, fine subangular blocky structure; slightly acid; clear smooth boundary; 2 to 6 inches thick.

B_{2-1} (17-27")

B_{2-1}. Mixed dark gray (10YR 4/1), dark yellowish-brown (10YR 4/4), and olive brown (2.5Y 4/4) firm silty clay loam to silty clay; moderate, fine to medium subangular blocky structure; slightly acid; gradual smooth boundary; 8 to 12 inches thick.

B_{2-2} (27-37")

B_{2-2}. Mixed gray and yellowish-brown (10YR 5/1 and 5/4) very firm silty clay; moderate, fine to medium subangular to angular blocky structure; slightly acid; clear smooth boundary; 8 to 12 inches thick.

C_1 (37-50")

C_1. Mixed dark gray (2.5Y 4/1) and yellowish-brown (10YR 5/4 and 5/6) firm clay loam grading to fine gravelly clay loam at the lower depth; massive; mildly alkaline; clear smooth boundary; 0 to 20 inches or more thick.

C_2 (50-60"+)

C_2. Mixed gray and yellowish-brown (10YR 5/1 and 5/4) fine gravelly clay loam; massive; calcareous.

Stratified silt loam and silty clay loam, rather than fine gravelly clay loam, underlie many areas of Martinton.

only in the northeastern and extreme western parts of the county in association with Milford silty clay loam to clay.

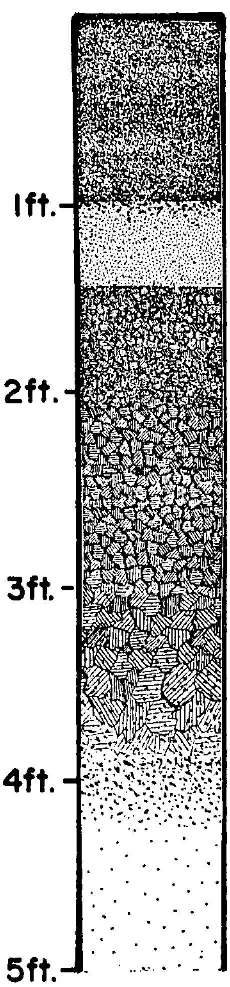
Martinton is high in organic matter, neutral to slightly acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high. Drainage may be needed in some of the areas, but moisture moves slowly in the subsoil, and tile function somewhat slowly. Productivity is high under good management (Table 30).

Onarga fine sandy loam (190)

Onarga fine sandy loam is a dark, well-oxidized soil. It formed under tall-grass prairie in sandy, water-deposited materials, some of which may have been moved by the wind. It is found mostly on moderately rolling knolls and ridges (2 to 8 percent slope) in the southwestern part of the county and elsewhere along a few streams. It is classed as a Brunizem soil.

Onarga is medium to strongly acid, medium to low in organic matter, low in available phosphorus, and low to medium in available potassium. It is about medium

Representative profile, Onarga fine sandy loam



A_1 (0-12″) — A_1. Very dark brown (10YR 2/2-2/3) very friable fine sandy loam; very weak, fine to medium crumb structure; slightly acid; gradual smooth boundary; 8 to 15 inches thick.

A_3 (12-17″) — A_3. Dark brown (7.5YR 3/4-4/4) very friable fine sandy loam; very weak, fine to medium crumb structure; slightly acid; gradual smooth boundary; 3 to 8 inches thick.

B_{2-1} (17-25″) — B_{2-1}. Dark brown (7.5YR 3/4-4/4) friable fine sandy clay loam; very weak, fine to medium subangular blocky structure; medium acid; gradual smooth boundary; 5 to 15 inches thick.

B_{2-2} (25-35″) — B_{2-2}. Dark brown (7.5YR 4/5) friable to slightly firm fine sandy clay loam to clay loam; very weak, fine to medium subangular blocky structure; medium acid; gradual smooth boundary; 5 to 15 inches thick.

B_3 (35-45″) — B_3. Dark brown (7.5YR 4/5) friable fine sandy loam; very weak, medium subangular blocky structure to single grain; medium acid; gradual smooth boundary; 3 to 15 inches thick.

C_1 (45-50″) — C_1. Strong brown (7.5YR 4/6) loose loamy sand; single grain; medium acid; clear smooth boundary; 0 to 10 inches or more thick.

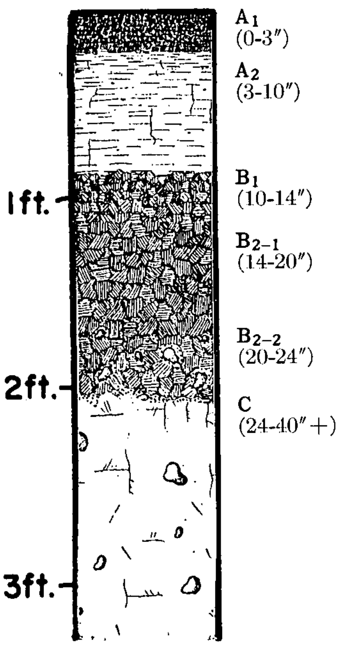
C_2 (50-60″+) — C_2. Brown (7.5YR 4/5) with varicolored sand grains; loose sand; single grain; medium acid.

in water-holding capacity but tends to be drouthy during relatively long dry periods. Productivity is moderately high where the soil is properly managed (Table 30). Clean-cultivated crops should be strip-planted with sod crops to guard against wind erosion. Red, white, and jack pine should grow well on this soil.

Morley silt loam (194)

Morley silt loam is a light-colored, moderately well- to well-oxidized soil formed in silty clay loam till with less than 2 feet of surficial drift (including loess). It developed under deciduous hardwood forest on moderately to strongly rolling topog-

Representative profile, Morley silt loam



A_1. Dark gray to dark grayish-brown (10YR 4/1-4/2) friable silt loam; fine to medium crumb structure; medium acid; abrupt smooth boundary; 1 to 5 inches thick.

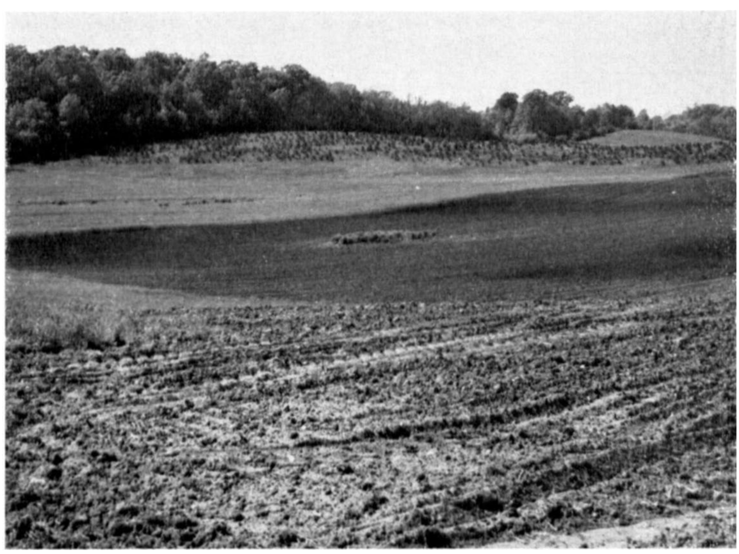
A_2. Brown (10YR 5/3) friable silt loam; very weak, very fine platy structure in place, breaking to weak, fine crumb; medium acid; clear smooth boundary; 5 to 12 inches thick.

B_1. Brown (10YR 4/3-5/3) moderately firm silty clay loam borderline to silt loam; moderate, fine subangular blocky structure with some thin gray silt coatings; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_{2-1}. Brown to light yellowish-brown (10YR 5/3-6/4) firm silty clay loam; moderate, medium subangular blocky structure; slightly acid; abrupt smooth boundary; 5 to 15 inches thick.

B_{2-2}. Dark yellowish-brown to brown (10YR 4/4-5/3) mottled with yellowish-brown and pale brown (10YR 5/6, 5/8, and 6/3); very firm gritty silty clay; moderate, medium subangular blocky structure; neutral; clear smooth boundary; 2 to 15 inches thick.

C. Grayish-brown to pale brown (10YR 5/2-6/3) firm silty clay loam; weak to moderate, medium irregular blocky structure in the upper part to massive in lower part; calcareous. Content of clay less than 2 microns in diameter ranges from 25 to 36% in the calcareous till.



The slopes in the immediate foreground and in the background are Morley silt loam, some of which has been eroded. The depression in center is a partially silted-in area of Peotone silty clay loam. (Fig. 15)

raphy (4 to 30 percent slopes). Scattered areas of Morley occur in various parts of the county, but most of it is in the northeastern portion in association with Blount and Beecher. It is classed as a Gray-Brown Podzolic soil.

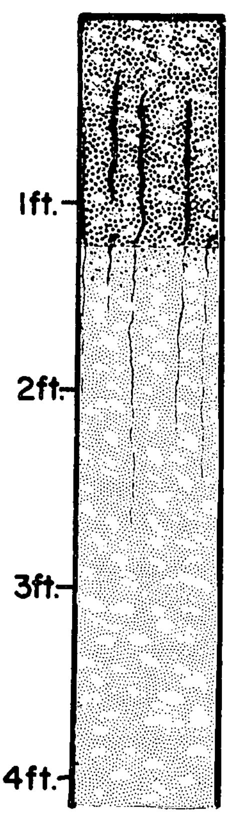
Morley is low in organic matter, about medium acid, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high but permeability is slow. Erosion is a very serious problem where this soil is cultivated (Fig. 15). Productivity is medium under good management (Table 30), but slopes greater than 6 to 8 percent, especially where eroded, should be kept in sod crops as much as possible or planted to trees.

Harpster fine sandy loam (196)

Harpster fine sandy loam is a moderately dark, poorly oxidized soil. It formed in fine sandy, water-deposited material under marsh vegetation that provided a suitable habitat for fresh-water snails, many of whose shells accumulated in the soil. It is found in shallow depressions in the southwestern part of the county in association with Maumee, Watseka, and other sandy soils. It is classed as a Humic-Gley soil.

This soil is calcareous, about medium in organic matter, and low in available phosphorus and potassium. It is low to medium in water-holding capacity but the natural water table is often near the surface and the soil is usually too wet for good crop growth unless adequately drained. Productivity is low unless the soil is drained

Representative profile, Harpster fine sandy loam



A_1 (0-6″)		A_1. Black (10YR 2/1) very friable fine sandy loam matrix with abundant white (10YR 8/1) fragments of snail shells which impart a grayish cast to the soil mass; very weak, fine crumb structure; calcareous; clear smooth boundary; 6 to 15 inches thick.
A_3 (6-15″)		A_3. Very dark grayish-brown (10YR 3/2), with channels and cavities filled with black (10YR 2/1) material; very friable fine sandy loam; very weak, fine crumb structure; calcareous; clear smooth boundary; 3 to 10 inches thick.
C_1 (15-25″)		C_1. Grayish-brown and yellowish-brown (10YR 5/2 and 5/4), with streaks of very dark grayish-brown (10YR 3/2); very friable to loose fine sandy loam to loamy fine sand; single grain; calcareous; abrupt smooth boundary; 0 to 15 inches or more thick.
C_2 (25-35″)		C_2. Gray, grayish-brown, and yellowish-brown (10YR 5/1, 5/2, and 5/8), with streaks of very dark grayish-brown (10YR 3/2); loose loamy fine sand; single grain; calcareous; clear smooth boundary; 0 to 15 or more inches thick.
C_3 (35-50″+)		C_3. Yellowish-brown (1Y 5/4) loose loamy fine sand to fine sand, mottled with grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/8); single grain; calcareous.

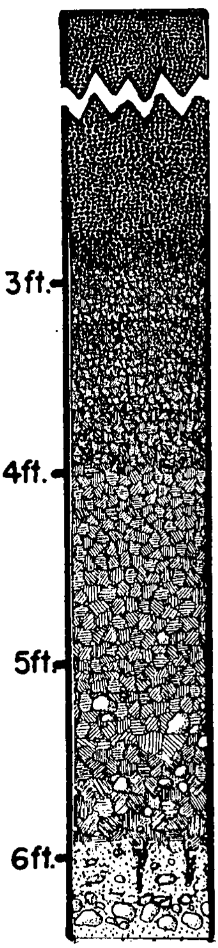
and properly fertilized, after which it is medium to moderately high (Table 30). Limestone should not be applied and rock phosphate is ineffective in this calcareous soil.

Troxel silt loam (197)

Troxel silt loam is a dark, well- to moderately well-oxidized soil formed in 4 feet or more of silty material on coarse-textured drift. It developed under prairie vegetation in depressions. This type occurs primarily on outwash plains in the western and northwestern part of Will county in association with Warsaw and Lorenzo soils. It is classed as a Brunizem soil.

Troxel is high in organic matter, mostly medium acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. Water table is usually deep but in some areas may seasonally rise to within 3 feet of the surface. Drainage may be needed in some areas but not in others. Productivity is high when the soil is properly fertilized and otherwise well managed (Table 30).

Representative profile, Troxel silt loam



A_1 (0-33″) — A_1. Black (10YR 2/1) friable silt loam; moderate, medium to coarse crumb to granular structure; medium acid; diffuse smooth boundary; 20 to 40 inches thick.

A_3 (33-40″) — A_3. Very dark brown (10YR 2/2) friable silt loam; weak, fine subangular blocky structure; medium acid; diffuse smooth boundary; 5 to 15 inches thick.

B_1 (40-48″) — B_1. Brown (10YR 4/3 to 5/3) slightly firm light silty clay loam; weak to moderate, medium subangular blocky structure with thin brown clay coatings; medium acid; gradual smooth boundary; 5 to 15 inches thick.

B_2 (48-65″) — B_2. Brown (10YR 4/3 to 7.5YR 4/4) firm silty clay loam with some sand and a little fine gravel in lower part; moderate, medium to coarse subangular blocky structure with thin patchy clay coatings; medium acid; abrupt smooth boundary; 10 to 25 inches thick.

B_3 or "Beta" (65-72″) — B_3. Dark brown (7.5YR 3/2) sandy clay loam to fine gravelly clay loam; neutral; abrupt irregular boundary; 0 to 15 inches thick.

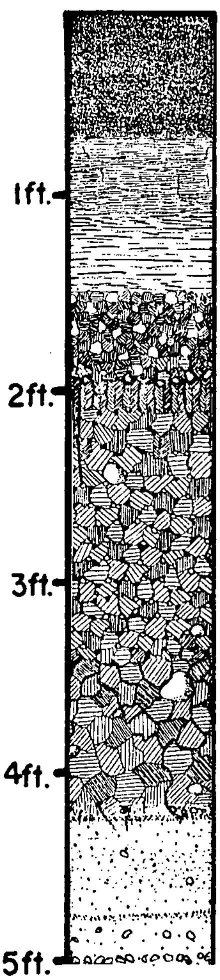
C (72-78″+) — C. Dark yellowish-brown and gray (10YR 4/4 and 7/2) with varicolored pebbles; loose loamy fine gravel; calcareous.

Thorp silt loam (206)

Thorp silt loam is a moderately dark, poorly oxidized soil formed in silty-textured sediments (including some loess) on medium-textured drift. It developed under prairie vegetation in shallow depressions that received some run-off water from adjacent higher land. This extra water drained through the soil to underground outlets and thus hastened soil development. Thorp occurs as small scattered spots in various parts of the county, primarily in association with Proctor and Brenton. It is classed as a Planosol intergrade to Low Humic-Gley soil.

Thorp is moderately high in organic matter, medium to strongly acid, low in available phosphorus, and low in available potassium. Water-holding capacity is high and permeability is slow. Drainage is needed but tile function slowly. Surface ditches or furrows are usually more effective than tile. Productivity is medium to moderately high where the soil is adequately drained and otherwise well managed (Table 30).

Representative profile, Thorp silt loam



A_p (0-8")

A_p. Very dark gray to very dark brown (10YR 3/1-2/2) friable silt loam; weak, fine crumb structure; medium acid; abrupt smooth boundary. A_1 varies from 7 to 12 inches thick.

A_{2-1} (8-13")

A_{2-1}. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) friable silt loam; very weak, very fine platy structure breaking to fine crumb; strongly acid; clear smooth boundary; 3 to 10 inches thick.

A_{2-2} (13-18")

A_{2-2}. Dark gray (10YR 4/1) friable silt loam; weak, fine platy structure, breaking to fine crumb or sometimes very weak, very fine subangular blocky structure in the lower part; strongly acid; abrupt to clear smooth boundary; 0 to 8 inches thick.

B_1 (18-22")

B_1. Grayish-brown (10YR 5/2) mottled with yellowish-brown (10YR 5/4); moderately firm silty clay loam borderline to silt loam, with sometimes an occasional small pebble; moderate, very fine to fine subangular blocky structure; strongly acid; clear smooth boundary; 0 to 6 inches thick.

B_2 (22-50")

B_2. Gray (10YR 5/1-6/1) mottled with yellowish-brown (10YR 5/4-5/6); firm silty clay loam, usually with some grit or fine gravel; moderate, medium subangular to angular blocky structure; strongly acid in the upper part to medium acid in the lower part; clear smooth boundary; 10 to 30 inches thick.

C (50-60"+)

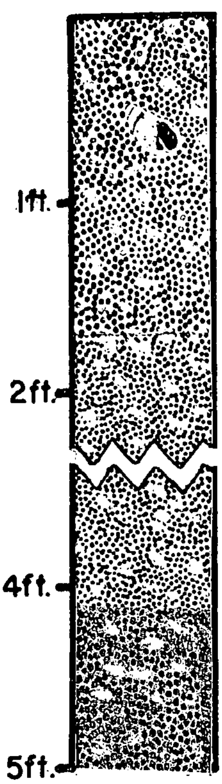
C. Gray (N 6/0 to 10YR 6/1) mottled with yellowish-brown to dark yellowish-brown (10YR 5/4-4/4); stratified loam, silt loam, sandy loam, fine gravelly clay loam; massive; neutral.

Lena muck (210)

Lena muck is a very dark, very poorly oxidized organic soil. It formed in undrained depressions through decomposition of fibrous or sedimentary peat. Most of the carbonates are due to accumulations of snail shells or shell fragments, but some are from decaying vegetation containing calcium carbonate within the plant cells. The important areas occur in the northern part of the county in Des Plaines river bottom and in a former channel of the Des Plaines river in association with Harpster, Drummer, and other soils. Lena is classed as a Bog soil.

This type is calcareous, very high in organic matter, and low in available phosphorus and available potassium. Permeability is moderate and water-holding capacity is high. Both drainage and heavy applications of phosphate and potash are needed for satisfactory production of grain and vegetable crops. Tile will get out of line and not function properly unless placed on a firm foundation. Open ditches or furrows may prove satisfactory. Productivity is high for corn (Table 30), and for certain vegetable crops when the soil is adequately drained, properly fertilized, and otherwise well managed.

Representative profile, Lena muck



A_{1-1} (0-20″) — A_{1-1}. Black (10YR 1/1 to 2/1) friable muck, usually containing abundant white flakes or fragments of snail shells; moderate, medium crumb to granular structure; calcareous; diffuse smooth boundary; 10 to 30 inches or more thick.

A_{1-2} (20-50″) — A_{1-2}. Black (10YR 2/1) friable muck with pieces of dark brown (10YR 3/3) vegetation and white flakes of snail shells; massive; calcareous; clear smooth boundary; 0 to 30 or more inches thick.

C (50-60″+) — C. Dark brown (7.5YR 3/4 to 4/4) friable fibrous peat with white snail shell fragments or dark gray (5Y 4/1) friable sedimentary peat with red (10R 4/8) mottles; massive; calcareous.

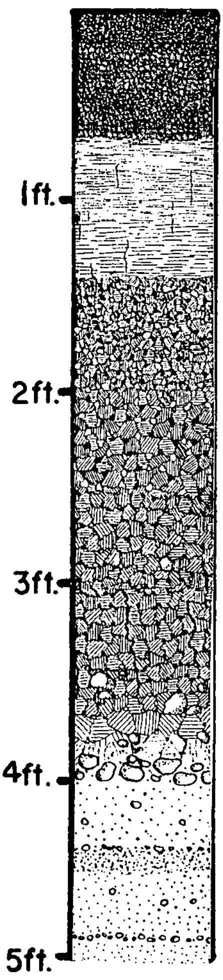
Millbrook silt loam (219)

Millbrook silt loam is a moderately dark, imperfectly oxidized soil formed in 1½ to 3 feet of silty material on stratified, medium-textured outwash. The solum is thicker than 3½ feet. This type developed under mixed prairie-forest vegetation or where

forest encroached on prairie. It occupies nearly level to very gently sloping topography (slopes 0 to 1½ percent). It occurs on outwash plains and terraces along some streams primarily in association with Brenton, Drummer, and Camden. It is classed as an imperfectly drained Gray-Brown Podzolic intergrade to an imperfectly drained Brunizem soil.

Millbrook is medium in organic matter, strongly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderate. The natural water table seasonally rises to about the 2-foot depth and drainage is needed. Productivity is moderately high when the soil is well fertilized and otherwise properly managed (Table 30).

Representative profile, Millbrook silt loam



A_1 (0-8″) — A_1. Very dark brown to very dark gray (10YR 2/2 to 3/1) friable silt loam; weak, fine crumb structure; medium acid; clear smooth boundary; 6 to 10 inches thick.

A_2 (8-17″) — A_2. Very dark grayish-brown to dark grayish-brown (10YR 3/2 to 4/2) very friable silt loam; weak, fine to medium platy structure; strongly acid; abrupt smooth boundary; 4 to 12 inches thick.

B_{2-1} (17-22″) — B_{2-1}. Dark grayish-brown (10YR 4/2) mottled with dark yellowish-brown (10YR 4/4); firm silty clay loam with some sand and a few small pebbles; moderate, fine to medium subangular blocky structure with thin dark gray clay films over most surfaces; strongly acid; clear smooth boundary; 4 to 8 inches thick.

B_{2-2} (22-34″) — B_{2-2}. Dark grayish-brown (10YR 4/2) mottled with brown to dark yellowish-brown (7.5YR 4/4 to 10YR 4/4-4/6); firm clay loam with some coarse sand and fine gravel; weak, medium subangular to angular blocky structure with thin patchy clay films; strongly acid; clear smooth boundary; 10 to 15 inches thick.

B_3 (34-44″) — B_3. Dark grayish-brown to gray (10YR 4/2 to 2.5Y 5/1) mottled with brown (7.5YR 4/4) and yellowish-brown (10YR 5/4-5/6); slightly firm light clay loam to sandy loam; medium acid; clear smooth boundary; 5 to 15 inches thick.

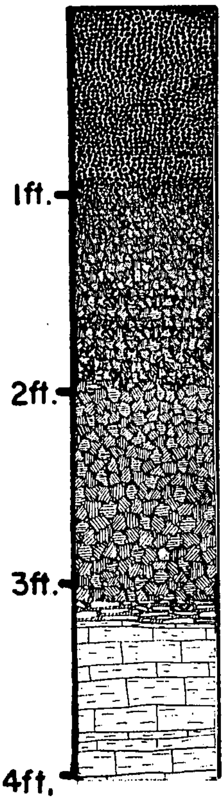
C (44-60″+) — C. Grayish-brown (10YR 5/2) to gray (N 5/0) sandy loam to fine gravelly clay loam with some faint dark brown to dark yellowish-brown mottles; massive; neutral.

Calcareous stratified silty, sandy, and gravelly sediments occur below 70 inches in the profile described. In other areas in Will county, calcareous, somewhat more gravelly material occurs at 60 inches or slightly less.

Plattville silt loam (220)

Plattville silt loam is a dark, imperfectly oxidized Brunizem soil formed in 25 to 48 inches of medium-textured drift, a portion of which may be loess, on level-bedded dolomitic limestone. It developed under tall-grass prairie vegetation on nearly level

Representative profile, Plattville silt loam



A_1 (0-11″)		A_1. Black to very dark brown (10YR 2/1-2/2) friable silt loam; weak, fine to medium crumb structure; slightly acid; clear smooth boundary; 8 to 14 inches thick.
A_3 (11-16″)		A_3. Very dark grayish-brown (10YR 3/2) friable silt loam; weak, fine to medium crumb to granular structure; medium acid; clear smooth boundary; 3 to 6 inches thick.
B_{2-1} (16-24″)		B_{2-1}. Dark grayish-brown (10YR 4/2) mottled with dark yellowish-brown (10YR 4/4); firm gritty silty clay loam; weak to moderate, fine to medium subangular blocky structure; medium acid; clear smooth boundary; 4 to 8 inches thick.
B_{2-2} (24-33″)		B_{2-2}. Mixed dark grayish-brown, yellowish-brown, and brown (10YR 4/2, 5/4 and 7.5YR 4/4) firm clay loam to silty clay loam; moderate, medium subangular blocky structure; medium acid; clear smooth boundary; 6 to 12 inches thick.
B_3 (33-38″)		B_3. Mixed brown, dark gray, dark grayish-brown, and yellowish-brown (7.5YR 4/4, 10YR 4/1, 4/2 and 5/6) friable to firm loam, silt loam, clay loam, or fine sandy loam which may or may not be stratified; weak, medium subangular blocky structure to massive; neutral; abrupt smooth boundary; 3 to 10 or more inches thick.
R (38″+)		R. Very pale brown (10YR 7/3-7/5) bedrock dolomitic limestone.

In Will county, areas of the moderately well to well oxidized associates were included with Plattville.

to very gently rolling topography (slopes less than about 3 percent). It occurs as scattered areas in the western part of the county in association with Channahon and Millsdale.

Plattville is high in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high in the material above the bedrock. Drainage may be needed in some areas. Productivity is high under good management (Table 30), particularly where depth to bedrock is greater than 3 feet.

Eylar silt loam (228)

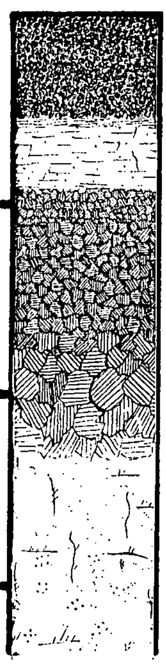
Eylar silt loam is a light-colored, imperfectly oxidized Gray-Brown Podzolic soil formed in silty clay till with less than 2 feet of medium-textured surficial drift (including loess). It developed under deciduous hardwood forest on nearly level to moderately rolling topography (slopes of ½ to 12 percent). Scattered areas of this type occur in the northeastern part of the county primarily in association with Frankfort, and Chatsworth. Some physical and chemical properties of an Eylar soil are given in Table 18.

Eylar is low in organic matter, medium acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high but permeability of the underlying till is very slow and moisture movement is so slow that the soil tends to be drouthy. Some areas need drainage but tile do not function well. Ero-

Some slopes in the Eylar and Frankfort soil areas are so severely eroded that they have little or no productive value. Everybody farming these soils should aim to preserve some A and B horizon material. (Fig. 16)

sion is a problem on slopes greater than 2 or 3 percent (Fig. 16). Productivity is low even under good management (Table 30), and this soil should be kept primarily in legume-grass crops or in trees, particularly where slopes are greater than 3 or 4 percent.

Representative profile, Eylar silt loam



A_p (0-6″) — A_p. Dark gray to dark grayish-brown (10YR 4/1-4/2) friable silt loam; weak, fine crumb structure; slightly acid; abrupt smooth boundary. The A_1 horizon varies from 1 to 5 inches in thickness in unplowed areas.

A_2 (6-11″) — A_2. Gray to grayish-brown (10YR 5/1-5/2) friable silt loam; weak, very fine platy structure breaking to very weak, fine crumb; strongly acid; abrupt smooth boundary; 4 to 10 inches thick.

B_1 (11-14″) — B_1. Gray (10YR 5/1) mottled with yellowish-brown (10YR 5/4); firm silty clay loam; moderate, fine subangular blocky structure with thin light gray (10YR 6/1) silty coatings; strongly acid; clear smooth boundary; 0 to 5 inches thick.

IIB_2 (14-26″) — IIB_2. Mixed gray and dark yellowish-brown (10YR-2.5Y 5/1, and 10YR 4/4) mottled with yellowish-brown (10YR 5/6); very firm silty clay to clay; strong, fine to medium angular blocky structure with some dark (10YR 2/2) organic-clay coatings; medium acid in the upper part to neutral in lower part; clear smooth boundary; 10 to 16 inches thick.

IIC (26-40″+) — IIC. Gray and olive brown (2.5Y 5/1 and 4/4), with streaks of light gray (10YR 6/1) secondary lime; very firm silty clay; coarse, angular blocky structure to massive; calcareous. Content of clay less than 2 microns in diameter is greater than 36% in the calcareous till.

Some areas included with Eylar in Will county have more uniform yellowish-brown upper B horizons.

Table 18. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF EYLAR SILT LOAM[a]

Horizon	Depth	Particle size distribution[b] Gravel	Sand	Silt	Clay	Exchangeable cations Ca	Mg	K	Cation exchange capacity	Base saturation	pH	Organic carbon
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_{1-1}....	0–3	.4	12.0	67.6	20.4	14.3	7.4	.60	21.0	100+	7.3	3.96
A_{1-2}....	3–5	.5	13.1	67.0	19.9	9.8	5.5	.35	14.6	100+	7.3	2.34
A_2......	5–9	1.7	13.0	66.7	20.3	5.1	3.9	.30	9.8	95	7.1	.88
B_1......	9–14	1.2	9.6	55.8	34.6	3.7	4.6	.36	12.8	68	5.2	.52
B_2......	14–21	.7	7.4	40.9	51.7	4.8	5.8	.40	18.4	52	4.5	.50
B_3......	21–26	.8	8.8	42.1	49.1	7.0	9.4	.25	16.0	100+	5.8	.45
C......	26–45	4.9	16.7	41.7	41.6	....[c]	...	...	....	....	7.8	.35

[a] Will County, T.35N, R.12E, Sec. 19, NE ¼, SE 40, SE 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Ashkum silty clay loam (232)

Ashkum silty clay loam is a very dark, poorly oxidized soil formed in less than 42 inches of medium- to moderately fine-textured drift on silty clay loam till. The upper material is mostly local slope-wash but includes some loess. Ashkum developed under wet prairie or marsh vegetation on nearly level areas or along upland drainageways. It occurs primarily in the central and eastern parts of the county in association with Elliott and Beecher. It is classed as a Humic-Gley soil. Some physical and chemical properties of Ashkum are given in Table 19.

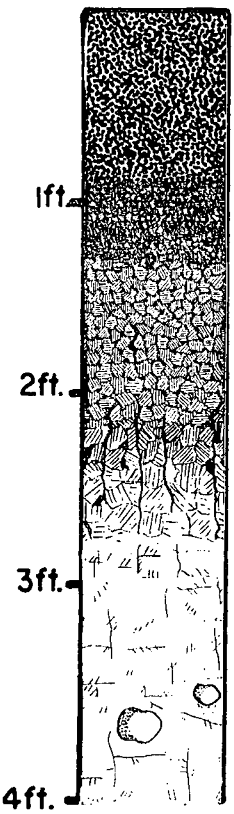
Ashkum is high in organic matter, neutral to very slightly acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high and permeability is moderate in the solum but moderately slow in the underlying till. Drainage is needed and surface ditches may prove more economical than tile. Tile function slowly but are generally effective, particularly if a deep-rooting legume

Table 19. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF ASHKUM SILTY CLAY LOAM[a]

Horizon	Depth	Particle size distribution[b] Gravel	Sand	Silt	Clay	Exchangeable cations Ca	Mg	K	Cation exchange capacity	Base saturation	pH	Organic carbon
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p.....	0–6	T[c]	7.7	52.7	39.6	28.7	10.1	.50	38.2	82	6.4	4.7
A_{1-1}....	6–8	T	7.9	51.0	41.1	29.9	10.3	.50	37.5	83	6.5	4.1
A_{1-2}....	8–11	T	9.0	48.9	42.1	25.0	9.8	.40	31.6	88	6.8	1.9
B_1......	11–16	T	9.2	49.7	41.1	20.6	8.4	.40	26.4	89	7.1	1.0
B_{2-1}....	16–21	T	7.3	52.9	39.8	17.8	7.8	.40	23.6	91	7.3	.6
B_{2-2}....	21–26	T	6.5	53.8	39.7	18.4	8.6	.40	23.5	93	7.3	.5
B_3......	26–32	T	14.5	48.5	37.0	14.2	6.4	.30	18.0	94	7.5	.6
IIC....	32–50	T	15.2	48.7	36.1	....[d]	....	...	....	..	7.9	.7

[a] Will County, T.34N, R.11E, Sec. 22, NW ¼, NE 40, NE 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] T = Trace.
[d] Not determined.

Representative profile, Ashkum silty clay loam



A_1 (0-11″)

A_1. Black (10YR 1/1-2/1) friable to moderately firm silty clay loam; moderate, medium to coarse granular structure; slightly acid; gradual smooth boundary; 10 to 16 inches thick.

A_3-B_1 (11-16″)

A_3-B_1. Black to very dark gray (10YR 2/1-3/1) with few fine faint dark grayish-brown (2.5Y 4/2) mottles; firm silty clay loam to silty clay; moderate, fine subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 6 inches thick.

B_2 (16-25″)

B_2. Dark gray to dark grayish-brown (10YR 4/1 to 2.5Y 4/2) mottled with light olive brown (2.5Y 5/4); firm silty clay loam to silty clay; moderate, fine to medium subangular blocky structure; slightly acid; clear smooth boundary; 8 to 14 inches thick.

B_3 (25-32″)

B_3. Mixed dark grayish-brown and light olive brown (2.5Y 4/2 and 5/4) mottled with dark yellowish-brown (10YR 4/4); firm silty clay loam; moderate, fine to medium subangular blocky structure; neutral to mildly alkaline; clear smooth boundary; 3 to 10 inches thick.

IIC (32-50″+)

IIC. Mixed dark gray to grayish-brown and light olive brown (2.5Y 4/1-5/2 and 5/4) firm silty clay loam; medium to coarse subangular blocky structure to massive; calcareous. Content of clay (<2 microns) ranges from 25 to 36%.

One to several krotovinas per square foot are present throughout the B and into the C horizon in most Ashkum soil areas in Will county.

is grown every 4 or 5 years. Productivity is moderately high to high where the soil is adequately drained and otherwise well managed (Table 30).

Bryce clay loam to clay (235)[1]

This very dark, poorly oxidized soil was formed in 1 to 3 feet of water-deposited material on calcareous silty clay till or lake-bed sediment. The water-deposited material came mostly from adjacent slopes. Bryce developed under marsh or sloughgrass vegetation on broad, nearly level areas or in shallow depressions where the natural water table stood at or near the surface until relatively recent time. This type occurs primarily in the northeastern part of Will county in association with Frankfort and Mokena. It is classed as a Humic-Gley soil. Some physical and chemical properties of a Bryce soil are given in Table 20.

Bryce is high in organic matter, slightly acid to neutral, low in available phosphorus, and medium in available potassium. Water-holding capacity is high but moisture movement through the soil is slow to very slow, particularly in the calcareous till. Drainage is needed before grain crops can be grown satisfactorily. Tile draw very slowly and should be supplemented or replaced with open ditches. Productivity is moderately high where the soil is adequately drained and well managed (Table 30).

---

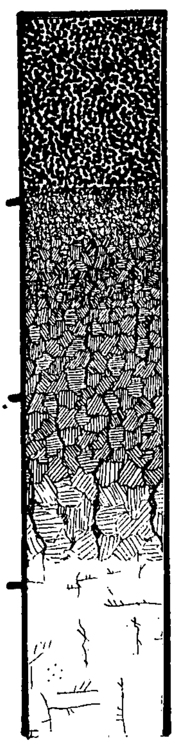
[1] After the Will county soil map was printed, the name Bryce clay loam to clay was changed to Bryce silty clay loam to silty clay.

Table 20. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF BRYCE CLAY LOAM TO CLAY[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_{1-1}....	0–6	....[c]	10.9	51.2	37.9	20.4	10.4	.55	32.8	96	6.3	4.3
A_{1-2}....	6–12	....	7.8	49.0	43.2	20.7	11.0	.38	31.1	100+	6.5	2.7
B_1......	12–15	....	7.6	46.6	45.8	18.6	11.7	.36	27.7	100+	6.8	1.7
B_{2-1}....	15–21	....	6.2	49.5	44.3	17.3	11.4	.28	24.0	100+	7.3	.9
B_{2-2}....	21–24	....	....	....	....	....	....	...	....	....	...	....
B_{2-3}....	24–30	....	5.1	48.3	46.6	17.1	10.9	.26	22.8	100+	7.5	.5
B_3......	30–34	....	4.8	52.2	43.0	16.7	10.1	.26	21.3	100+	7.5	.4
IIC....	34–58	....	7.9	48.8	43.3	....	....	...	....	....	7.9	.4

[a] Iroquois County, T. 24N, R. 13W, Sec. 19, SW ¼, SW 40, SW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05–.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Representative profile, Bryce clay loam to clay



A_1 (0-11″) **A_1.** Black (10YR 1/1-2/1) friable to slightly firm silty clay loam to silty clay; moderate, fine granular to very fine subangular blocky structure; slightly acid; gradual smooth boundary; 10 to 16 inches thick.

A_3-B_1 (11-14″) **A_3-B_1.** Black (10YR 2/1) to very dark gray (2.5Y 3/0) with few fine faint brown (10YR 5/3) to light olive brown (2.5Y 5/4) mottles; firm silty clay; moderate, very fine to fine subangular blocky structure; neutral; gradual smooth boundary; 3 to 6 inches thick.

B_{2-1} (14-18″) **B_{2-1}.** Very dark gray (2.5Y 3/0-3/1) with few fine faint olive brown to light olive brown (2.5Y 4/4-5/3) mottles; firm silty clay; moderate, fine subangular to angular blocky structure; neutral; gradual smooth boundary; 3 to 6 inches thick.

B_{2-2} (18-28″) **B_{2-2}.** Mixed dark gray and light olive brown (2.5Y 4/1 and 5/4) with few fine faint dark gray (10YR 4/1) mottles; firm silty clay; moderate, fine subangular to angular blocky structure; neutral; gradual smooth boundary; 6 to 12 inches thick.

B_3 (28-32″) **B_3.** Olive gray (5Y 5/2) mottled with light olive brown (2.5Y 5/4) and dark yellowish-brown (10YR 4/4); firm silty clay loam to silty clay; moderate, medium to coarse subangular to angular blocky structure to massive; weakly calcareous; gradual smooth boundary; 3 to 6 inches thick.

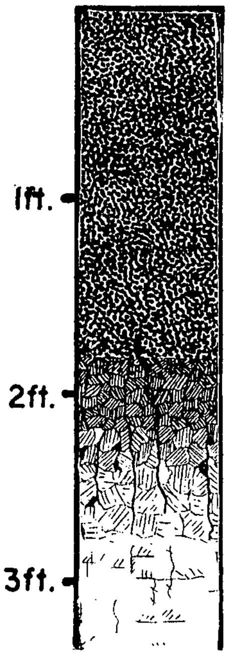
IIC (32-45″+) **IIC.** Gray (5Y 5/1) mottled with dark yellowish-brown to yellowish-brown (10YR 4/4-5/4); very firm silty clay; massive; calcareous.

One to several krotovinas per square foot extend through the B horizon and sometimes a few inches into the C in most areas of this soil.

Rantoul silty clay (238)

Rantoul silty clay is a very dark, very poorly oxidized soil formed in closed depressions from fine-textured sediments washed from adjacent slopes. It developed under marsh or sloughgrass vegetation, with a water table at or slightly above the surface

Representative profile, Rantoul silty clay



A_1 (0-22″) — A_1. Black (10YR 1/1-N 2/0) firm silty clay loam in the upper part to silty clay in lower part; breaks to moderate fine to medium granular to very fine subangular blocky structure after partial drying; neutral; gradual smooth boundary; 10 to 30 inches thick.

A_{3-1} (22-26″) — A_{3-1}. Very dark gray (10YR 3/1) with few fine distinct dark yellowish brown (10YR 4/4) mottles; firm silty clay loam to silty clay; breaks to moderate medium to coarse subangular to angular blocky structure after partial drying; neutral; diffuse smooth boundary; 0 to 10 inches thick.

A_{3-2}-C (26-40″+) — A_{3-2}-C. Dark gray (10YR 4/1) firm silty clay loam to silty clay; very coarse blocky to massive; neutral to alkaline.

One to several krotovinas per square foot extend to depths of 3 to 4 feet or more in Rantoul soil areas, particularly along the outer edges.

much of the time. Rantoul occurs in small scattered areas primarily in the northeastern part of the county in association with Bryce and Frankfort soils. It is classed as a Humic-Gley soil.

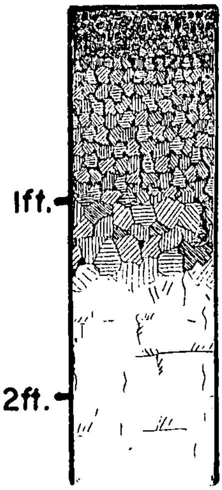
Rantoul is high in organic matter, neutral, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high, but moisture movement through the soil is slow to very slow and the areas are usually ponded unless drained by open ditches or open tile inlets. The soil is difficult to drain because of its topographic position. Without adequate drainage, grain and forage crop yields are seldom satisfactory. With adequate drainage and other good management practices, however, productivity is moderate to moderately high (Table 30).

Chatsworth silty clay to clay (241)

Chatsworth silty clay to clay is a light-colored, imperfectly to moderately well-oxidized soil formed in silty clay till with little or no medium-textured surficial material. It developed under deciduous hardwood forest on strongly rolling topography (slopes greater than 10 to 15 percent). Chatsworth is a very minor type, occurring as small scattered areas in the northeastern part of the county, primarily in association with Eylar, Frankfort, and Morley. It is classed as a Regosol intergrade to Gray-Brown Podzolic soil.

Chatsworth is low in organic matter, slightly acid to neutral, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high but permeability is very slow. Erosion is serious where the native forest cover has been removed. This soil should not be cultivated. It should best remain in trees. On areas that have already been cleared and have not yet been severely eroded, grasses and legumes may be grown with fair success. No productive use is known for areas that have been eroded into the underlying calcareous till (Fig. 16).

Representative profile, Chatsworth silty clay to clay



A_1 (0-4″) — A_1. Dark grayish-brown (10YR 4/2) friable to firm silty clay borderline to silty clay loam; moderate, medium granular structure; neutral; abrupt smooth boundary; 1 to 5 inches thick.

B_2 (4-16″) — B_2. Brown (10YR 5/3) very firm silty clay to clay; strong, medium subangular to angular blocky structure; neutral; clear smooth boundary; 4 to 14 inches thick.

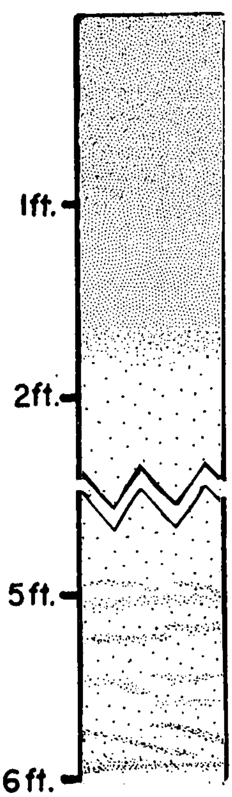
C (16-30″+) — C. Brown (10YR 5/3) in upper few inches to grayish-brown (2.5Y 5/2) mottled with light olive brown (2.5Y 5/4) in lower part; very firm silty clay; strong, medium angular blocky structure in upper part; grading to massive in lower part; calcareous.

In uncleared, uneroded areas the A_1 is usually a silt loam and a silt loam A_2 is often present. Both were formed from remnants of a loess cover. Also many areas mapped Chatsworth soil in Will county are severely eroded and much or all of the A and B horizons as described here are absent.

Oquawka sand (270)

This moderately dark, well-oxidized soil developed under mixed prairie and forest vegetation or encroachment of forest on prairie. Parent materials were sands and fine sands originally deposited by Kankakee torrent waters and later reworked

Representative profile, Oquawka sand



A_1 (0-10″) — A_1. Very dark brown (7.5YR 2/3) loose sand to fine sand; very weak, fine crumb structure to single grain; strongly acid; gradual smooth boundary; 5 to 12 inches thick.

A_2 (10-20″) — A_2. Dark brown (7.5YR 3/3) loose sand to fine sand; single grain; strongly acid; gradual smooth boundary; 5 to 30 inches thick.

A_3 (20-60″) — A_3. Yellowish-brown (10YR 5/4) loose sand to fine sand; single grain; strongly acid in both upper and lower parts; 20 to 50 inches or more thick.

A_3-B (60-72″+) — A_3-B. Yellowish-brown (10YR 5/4) loose fine sand interlayered with brown (7.5YR 4/4) loamy fine sand to fine sandy loam; medium to slightly acid becoming neutral to calcareous at lower depths.

Many areas mapped Oquawka sand in Will county are more nearly fine sand to loamy fine sand in texture. Also a few areas have thin brown clay-iron banding at depths of 50 to 60 inches. They are somewhat less drouthy than typical Oquawka.

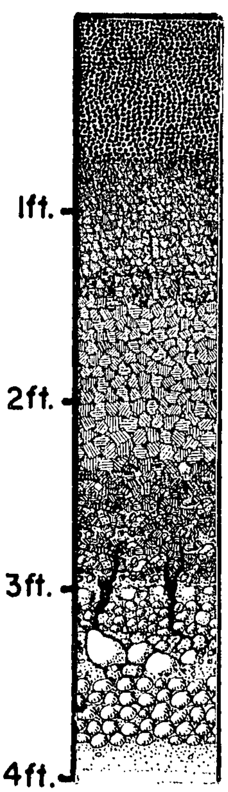
by wind. Oquawka occupies gently to strongly rolling knolls and ridges (1 to 15 percent slopes) primarily in the southwestern part of the county. Its A_1 horizon is thicker than the A_1 of Plainfield (which is less than 5 inches) but not as thick as the A_1 of Hagener (which is greater than 12 inches). Oquawka is classed as an intergrade between Gray-Brown Podzolic and Brunizem soils.

Oquawka is strongly acid and low in organic matter, available phosphorus, and available potassium. Water-holding capacity is low and the soil is drouthy. Productivity is low to moderate for most of the important corn belt crops (Table 30). Early-maturing small grains and drouth-resistant crops produce better average yields than corn or soybeans. Clean-cultivated crops, if grown, should be strip-planted with sod crops to guard against wind erosion. Adapted trees such as red, white, and jack pine have grown satisfactorily on this soil.

Warsaw silt loam (290)

Warsaw silt loam is a dark, well-oxidized soil formed in 2 to 3½ feet of loam to silt loam material on calcareous loamy gravel drift. It developed under tall-grass prairie vegetation on nearly level to moderately rolling topography (slopes of 6 percent or less). Warsaw occurs in the western and northwestern parts of the county on broad outwash plains and stream terraces in association with Lorenzo, Will, and Troxel soils. It is classed as a Brunizem soil. Some physical and chemical properties of a Warsaw soil are given in Table 21, page 65.

Representative profile, Warsaw silt loam



A_1 (0-10″) — A_1. Very dark brown (10YR 2/2) friable silt loam; weak, medium crumb structure; slightly acid; gradual smooth boundary; 8 to 16 inches thick.

A_3 (10-15″) — A_3. Very dark grayish-brown (10YR 3/2) friable heavy silt loam; moderate, medium granular to very fine subangular blocky structure; slightly acid; clear smooth boundary; 4 to 8 inches thick.

B_1 (15-19″) — B_1. Dark brown to dark yellowish-brown (10YR 3/3 to 4/4) slightly firm silty clay loam; moderate, fine subangular blocky structure; slightly acid; clear smooth boundary; 3 to 5 inches thick.

B_2 (19-29″) — B_2. Dark yellowish-brown (10YR 3/4 to 4/4), sometimes nearly dark brown (7.5YR 4/4); firm clay loam; moderate, medium subangular blocky structure; slightly acid to neutral; clear smooth boundary; 6 to 15 inches thick.

IIB_3 or "Beta" (29-36″) — IIB_3. Dark brown (7.5YR 3/2 to 4/4) moderately sticky gravelly loam; very coarse blocky structure to massive; neutral, except remnants of limestone pebbles are calcareous; abrupt irregular boundary; 5 to 10 inches thick.

IIC (36-48″+) — IIC. Primarily light yellowish-brown (10YR 6/4) loose loamy gravel but with varicolored rock fragments, probably 50% or more limestone and dolomite; single grain; calcareous.

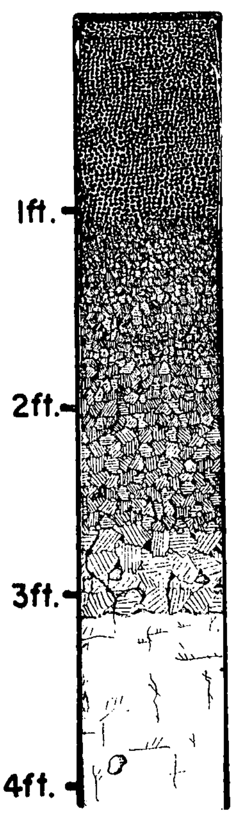
Warsaw is high in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high in the medium-textured material but very low in the underlying loamy gravel, and the soil is somewhat drouthy. Permeability is moderate in the solum but very rapid in the loamy gravel. The water table is deep and drainage is not needed. Productivity is moderately high in seasons of adequate rainfall if the soil is well managed (Table 30).

A complex of Warsaw (290) with Lorenzo (318) is shown on the soil map in a number of areas in the western and northwestern parts of the county. In these areas, depth to the underlying loose calcareous loamy gravel varies within short distances from slightly more than 2 feet to slightly less than 2 feet. Soil features are similar to those of Warsaw and management practices should be similar. The areas will tend to be somewhat more drouthy than Warsaw.

Andres silt loam (293)

This dark, imperfectly oxidized Brunizem soil was formed in 2 to 4 feet of loam or silt loam drift (of which a few inches may be loess) on calcareous silty clay loam till. It developed under tall-grass prairie vegetation on gentle (1 to 3 percent) slopes. Scattered areas of this type occur in various parts of the county, but the largest acreage concentration lies just south of Joliet.

Representative profile, Andres silt loam



A_1 (0-13″)
A_3 (13-17″)
B_1 (17-21″)
B_{2-1} (21-28″)
B_{2-2} (28-32″)
B_3-C (32-38″)
IIC (38-50″+)

A_1. Black to very dark brown (10YR 2/1-2/2) friable loam to silt loam with some fine sand; weak, fine crumb to granular structure; slightly acid; gradual smooth boundary; 10 to 16 inches thick.

A_3. Very dark brown to very dark grayish-brown (10YR 2/2-3/2) friable loam to silt loam; weak, very fine subangular blocky structure; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_1. Very dark grayish-brown to dark gray (10YR 3/2-4/1) mottled with yellowish-brown (10YR 5/4-5/8); friable to firm clay loam; weak, very fine to fine subangular blocky structure coated grayish-brown (2.5Y 5/2); slightly acid; gradual smooth boundary; 3 to 6 inches thick.

B_{2-1}. Dark grayish-brown (10YR 4/2) mottled with yellowish-brown (10YR 5/4-5/6); firm clay loam; weak to moderate, medium subangular blocky structure; neutral; gradual smooth boundary; 5 to 10 inches thick.

B_{2-2}. Mixed brown and yellowish-brown (10YR 4/3 and 5/4) firm clay loam to sandy clay loam with a few small pebbles; weak, medium subangular blocky structure; neutral; gradual smooth boundary; 4 to 10 inches thick.

B_3-C. Brown to dark yellowish-brown (10YR 4/3-4/4) with common, medium, faint, yellowish-brown (10YR 5/4-5/6) mottles; firm sandy clay loam to sandy loam; very weak, medium to coarse subangular blocky structure to massive; mildly alkaline; abrupt wavy boundary; 0 to 20 inches thick.

IIC. Olive brown and light olive brown (2.5Y 4/4 and 5/6) streaked with gray (5Y 5/1); very firm silty clay loam; massive; calcareous. Content of clay (<2 microns in diameter) in the calcareous till ranges between 25 and 36% (Table 25).

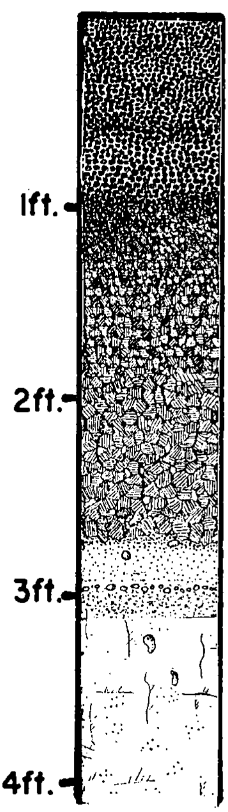
Andres is high in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high but moisture movement within the silty clay loam till is somewhat slow. Drainage is needed for maximum crop production. Productivity is moderately high to high where the soil is adequately drained, well managed, and properly fertilized (Table 30).

Symerton silt loam (294)

This is a dark, moderately well- to well-oxidized soil formed in 2 to 4 feet of loam or silt loam drift, with possibly a few inches of loess, on calcareous silty clay loam till. It developed under tall-grass prairie vegetation on moderately rolling topography (3 to 10 percent slopes). It occurs as scattered areas in association with Andres, Elliott, and Ashkum, mostly west and northwest of Joliet. It is classed as a Brunizem soil.

Symerton is high in organic matter, medium to slightly acid, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high but movement of moisture in the underlying silty clay loam till is slow. For the most part, drainage is not needed for maximum crop production. Productivity is moderately high where the soil is well managed and properly fertilized (Table 30).

Representative profile, Symerton silt loam



A_p (0-7″) — **A_p.** Very dark brown (10YR 2/2) friable to slightly firm gritty silt loam; very weak, medium to coarse granular structure to irregular cloddy; medium acid; abrupt smooth boundary.

A_{1-2} (7-12″) — **A_{1-2}.** Very dark brown (10YR 2/2) friable gritty silt loam; weak, fine crumb structure; medium acid; gradual smooth boundary. Total A_1 varies from 8 to 16 inches in thickness.

A_3 (12-16″) — **A_3.** Very dark grayish-brown (10YR 3/2) friable loam to silt loam; weak, medium granular to very fine subangular blocky structure; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_1 (16-23″) — **B_1.** Very dark brown to dark yellowish-brown (10YR 3/3-4/4) friable to slightly firm clay loam; weak, fine subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 8 inches thick.

B_{2-1} (23-27″) — **B_{2-1}.** Dark yellowish-brown to brown (10YR 4/4-4/5 to 5/3) firm gritty silty clay loam to clay loam; moderate, fine to medium subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 10 inches thick.

B_{2-2} (27-33″) — **B_{2-2}.** Dark yellowish-brown to yellowish-brown (10YR 4/4-5/4) firm clay loam to gritty silty clay loam with a few small pebbles; weak to moderate, medium subangular blocky structure; neutral; clear smooth boundary; 4 to 10 inches thick.

B_3-C (33-38″) — **B_3-C.** Dark grayish-brown (2.5Y 4/2) with common, prominent olive yellow (2.5Y 6/6) and light olive brown (2.5Y 5/3) mottles; friable stratified loam, silt loam, and fine sandy loam; neutral; abrupt smooth boundary; 0 to 20 inches thick.

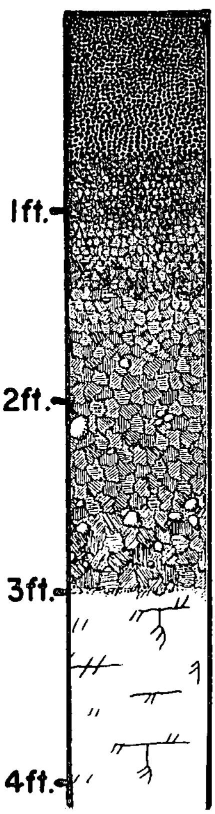
IIC (38-50″+) — **IIC.** Light olive brown (2.5Y 5/3) and dark yellowish-brown (10YR 4/4) with streaks of gray (2.5Y 6/1); very firm silty clay loam, massive; calcareous. Content of clay (<2 microns in diameter) ranges between 25 and 36% in the calcareous till.

Mokena silt loam (295)

Mokena silt loam is a dark, imperfectly oxidized Brunizem soil, formed in 2 to 4 feet of loam to silt loam drift on calcareous silty clay to clay till. It developed under tall-grass prairie vegetation on gently rolling topography (1 to 5 percent slopes). It occurs as small scattered areas in association with Frankfort and Bryce soils, primarily in the northeastern part of the county.

Mokena is high in organic matter, medium to slightly acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high but moisture moves very slowly in the silty clay or clay till. Drainage is needed for maximum production of grain crops. Because of the slow permeability of the underlying till, adequate drainage with tile may not be possible in every area. Open ditches may prove more satisfactory. Productivity is moderately high where the soil is uneroded and is adequately drained, well managed, and properly fertilized (Table 30). Where erosion has removed much or all of the friable overburden it is difficult to obtain satisfactory stands of grain crops, legumes, grass, or even trees.

Representative profile, Mokena silt loam



A_1 (0-9″)

A_1. Black to very dark brown (10YR 2/1-2/2) friable silt loam to loam; weak, fine crumb to granular structure; slightly acid; gradual smooth boundary; 8 to 16 inches thick.

A_3 (9-14″)

A_3. Very dark grayish-brown to dark grayish-brown (10YR 3/2-4/2) friable silt loam to loam; weak, fine to medium crumb to very fine subangular blocky structure; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_1 (14-19″)

B_1. Dark grayish-brown to grayish-brown (10YR 4/2-5/2) with common, fine, dark gray and yellowish-brown (10YR 4/1 and 5/6) mottles; slightly firm clay loam to silty clay loam; weak, very fine to fine subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 6 inches thick.

B_2 (19-31″)

B_2. Grayish-brown (10YR 5/2) with many fine to medium prominent yellowish-brown (10YR 5/6) mottles; firm clay loam with a few pebbles; weak, fine to medium subangular blocky structure; neutral; gradual smooth boundary; 6 to 14 inches thick.

B_3 (31-37″)

B_3. Mixed grayish-brown and yellowish-brown (10YR 5/2 and 5/6) slightly firm pebbly clay loam; very weak, medium to coarse subangular blocky structure to massive; mildly alkaline; abrupt wavy boundary; 0 to 20 inches thick.

IIC (37-50″+)

IIC. Grayish-brown (2.5Y 5/2) with common, medium, faint, light olive brown (2.5Y 5/4-5/6) mottles; very firm silty clay; medium to coarse angular blocky structure to massive; calcareous. Content of clay (<2 microns in diameter) is greater than 36% in the calcareous till.

As mapped in Will county, Mokena includes the areas of well and moderately well oxidized catena associates.

Beecher silt loam (298)

Beecher silt loam is a moderately dark, imperfectly oxidized soil formed in less than 20 to 24 inches of loess or medium-textured drift on silty clay loam till. Native vegetation was mixed prairie-forest or deciduous hardwood forest that recently en-

Table 21. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF WARSAW SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1......	0–10	.2	8.0	65.5	26.5	16.8	7.6	.24	23.9	100+	7.6	2.55
A_3–B_1...	10–13	.3	4.6	60.5	34.9	14.0	9.8	.27	25.0	97	7.3	1.34
B_{2-1}....	13–19	.2	4.1	60.4	35.5	11.4	7.7	.30	23.8	82	5.6	.91
B_{2-2}....	19–25	.4	12.4	59.9	27.7	8.0	6.6	.22	20.4	77	5.5	.51
IIB_3....	25–29	4.2	40.3	39.1	20.6	7.0	4.9	.18	14.4	85	5.8	.54
IIC....	29–50	81.8	86.5	11.8	1.7	....[c]	...	...	....	....	8.0	.22

[a] McHenry County, T.44N, R.8E, Sec. 25, SW ¼, SW 40, SW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0-.05 mm.; silt, .05-.002 mm.; clay, < .002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Table 22. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF BEECHER SILT LOAM[a]

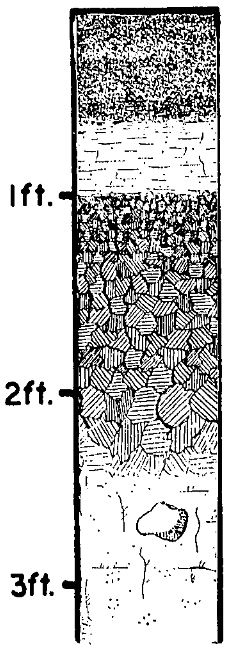
Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p.....	0–7	0.4	14.3	58.3	27.4	8.8	5.1	.85	17.2	87	5.4	3.46
A_2......	7–11	3.0	14.1	55.5	30.4	6.7	2.5	.60	14.4	69	4.9	1.53
B_1......	11–14	5.2	11.9	46.0	42.1	8.1	4.6	.54	18.4	73	4.7	1.10
B_{2-1}....	14–18	1.0	8.4	36.8	54.8	12.0	7.5	.52	23.4	86	5.0	.93
B_{2-2}....	18–22	2.8	8.9	39.3	51.8	12.8	7.8	.38	18.0	100+	6.0	.75
C......	34–40	2.9	13.2	52.6	34.2	....[c]	...	...	....	...	7.8	.34

[a] Will County, T.34N, R.14E, Sec. 24, SW ¼, SE 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0-.05 mm.; silt, .05-.002 mm.; clay, < .002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

croached on prairie. Beecher occurs on gently to moderately rolling areas (1 to 12 percent slopes) in association with Blount, Elliott, and Ashkum soils, primarily in the eastern part of the county but also in a few other scattered areas. It is classed as an imperfectly oxidized Gray-Brown Podzolic intergrading to an imperfectly oxidized Brunizem soil. Some physical and chemical properties of a Beecher soil are given in Table 22.

Beecher is medium in organic matter, medium to strongly acid, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high but moisture moves somewhat slowly in the calcareous till. Drainage is needed in the less sloping areas but tile tend to function slowly. Productivity is medium where the soil is well managed and properly fertilized (Table 30). Severely eroded slopes tend to be unproductive and good stands of grain, hay, or tree crops will be difficult to establish.

Representative profile, Beecher silt loam



A_1 (0-7″)

A_2 (7-12″)

B_1 (12-16″)

B_2 (16-27″)

C (27-40″+)

A_1. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) friable silt loam; weak, fine to medium crumb structure; medium acid; clear smooth boundary; 5 to 10 inches thick.

A_2. Dark gray to grayish-brown (10YR 4/1-5/2) friable silt loam; weak, fine platy structure in place breaking to weak, fine crumb; strongly acid; abrupt smooth boundary; 3 to 8 inches thick.

B_1. Dark gray to dark grayish-brown (10YR 4/1-4/2) with few, fine, faint, brown to yellowish-brown (10YR 5/3-5/4) mottles; firm silty clay loam; moderate, fine subangular blocky structure with some thin gray (10YR 5/2) silty coatings; strongly acid; clear smooth boundary; 0 to 6 inches thick.

B_2. Mixed grayish-brown, light olive brown, light brownish-gray, and brownish-yellow (2.5Y 5/2, 5/4, 10YR 6/2 and 6/6) firm to very firm silty clay; strong, medium to coarse angular blocky to weak prismatic structure with dark clay films; medium acid; clear smooth boundary; 5 to 15 inches thick.

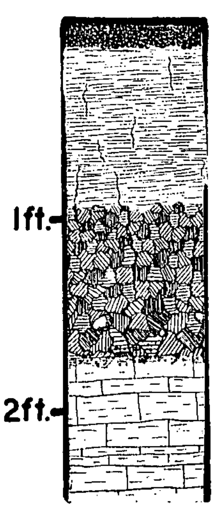
C. Grayish-brown to brown (10YR 5/2-5/3) mottled with light olive brown to light yellowish-brown (2.5Y 5/4-6/4); firm silty clay loam; weak, medium subangular blocky structure to massive; calcareous.

In Will county, Beecher includes some areas of the moderately well-oxidized catena associate.

Ritchey silt loam (311)

Ritchey silt loam is a light-colored, moderately well- to well-oxidized soil formed in 10 to 25 inches of medium-textured drift on level-bedded dolomitic limestone. A few inches of limestone residuum may be present in some areas but is mostly absent in Will county. The soil developed under deciduous hardwood forest on gently rolling to moderately rolling areas (1 to 10 percent slopes). It occurs primarily in

Representative profile, Ritchey silt loam



A_1 (0-2″)

A_2 (2-12″)

B_2 (12-21″)

R (21″+)

A_1. Very dark grayish-brown (10YR 3/2) friable silt loam; weak, fine crumb structure; medium acid; abrupt smooth boundary; 1 to 5 inches thick.

A_2. Brown (7.5YR 4/4) friable silt loam; very weak, very fine platy structure, breaking to very weak, fine crumb; medium acid; clear smooth boundary; 6 to 12 inches thick.

B_2. Brown to strong brown (7.5YR 4/4-4/6) moderately firm clay loam to silty clay loam; weak, medium subangular blocky structure to massive; slightly acid to neutral; abrupt smooth boundary; 8 to 16 inches thick.

R. Very pale brown (10YR 7/3) bedrock dolomite.

the southern part of the county in the Kankakee torrent valley but a few areas occur in the Des Plaines river valley. It is classed as a Gray-Brown Podzolic soil.

Ritchey is low in organic matter, medium to slightly acid, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high in the material above the bedrock, but the total amount of moisture available to plants is low and the soil is drouthy. Drainage is not needed but erosion is a serious problem on the steeper slopes. Productivity is medium to low even under good management (Table 30), particularly where bedrock is less than 15 to 18 inches deep.

In Will county a few areas included with Ritchey have slightly darker and thicker A_1 horizons than described. Also included are some areas with sandy loam surfaces and sandy clay subsoils, most of which occur near Kankakee river in the southern part of the county. In a few places bedrock is 30 inches deep.

Rodman loam (313)

Rodman loam is a light- to moderately dark-colored, well-oxidized soil. It formed from a thin layer (less than 10 inches) of medium-textured sediments on calcareous loamy gravel to gravel material (Fig. 17). Native vegetation was forest, prairie, or both. This type occupies nearly level areas for the most part, and occurs primarily along Des Plaines river in association with Lorenzo silt loam and Rodman gravelly loam. It is classed as a Regosol but may intergrade to Brown Forest soils.

Rodman is calcareous throughout and is low in available phosphorus and available potassium. Very rapid permeability and very low water-holding capacity make the soil drouthy. Productivity is low (Table 30). A representative profile is described on page 68.

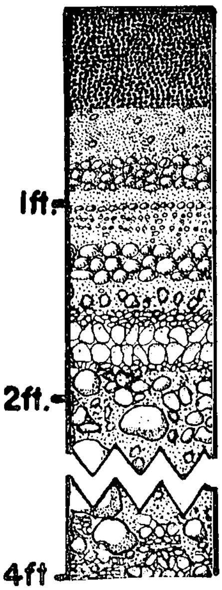
A section of Rodman loam about 5 feet deep. A few plant roots penetrate into the loose loamy gravel but most are concentrated in the dark loamy surface. (Fig. 17)

Joliet silt loam to silty clay loam (314)

Joliet silt loam to silty clay loam is a very dark, poorly oxidized soil formed in 10 to 25 inches of medium-textured drift on dolomitic limestone. It formed under marsh or sloughgrass vegetation on nearly level areas (slopes less than 1 percent) or in shallow depressions. It occurs in association with Romeo, Channahon, and other soils, primarily along Des Plaines river. The largest areas are found between Des Plaines and Kankakee rivers in the west-central part of the county. It is classed as a Humic-Gley soil.

Joliet soils are high in organic matter, neutral to weakly calcareous, and low in available phosphorus and available potassium. Water-holding capacity is high in the material above the bedrock but because this material is relatively thin the total water available for plant growth may be low. Drainage is needed for general farm

Representative profile, Rodman loam

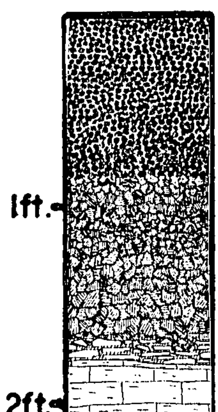


A_1 (0-6″) — A_1. Dark brown (7.5YR 3/2) friable loam; weak, medium crumb to granular structure; calcareous; clear smooth boundary; 2 to 10 inches thick.

A_3 (6-8″) — A_3. Dark brown (7.5YR 3/3 to 4/3) friable gravelly loam; moderate, medium granular structure between gravels; calcareous; abrupt smooth boundary; 0 to 8 inches thick.

C (8-48″+) — C. Varicolored gravels mostly 1/2 to 6 inches in diameter which are usually more than 60 percent limestone and dolomite; some sand and finer material; calcareous.

Representative profile, Joliet silt loam to silty clay loam



A_1 (0-10″) — A_1. Black (10YR 1/1-2/1) friable silt loam to silty clay loam; moderate, fine crumb to granular structure; neutral to calcareous with occasional white fragments of snail shells; gradual smooth boundary; 8 to 16 inches thick.

A_3 (10-14″) — A_3. Very dark gray (10YR 3/1) moderately firm silty clay loam; weak to moderate, fine subangular blocky structure; neutral to calcareous; gradual smooth boundary; 0 to 6 inches thick.

B_2 (14-20″) — B_2. Very dark gray (10YR 3/1) mottled with light olive brown (2.5Y 5/6) to brownish-yellow (10YR 6/6); firm silty clay loam; weak to moderate, medium subangular blocky structure to massive; neutral to calcareous; abrupt smooth boundary; 5 to 15 inches thick.

R (20″+) — R. Light gray to very pale brown (10YR 7/2-7/3) bedrock dolomitic limestone.

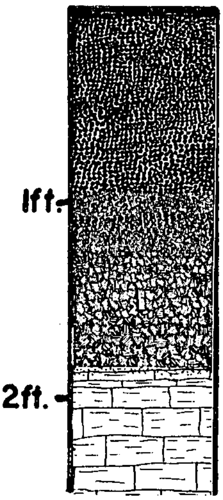
The snail shell fragments are not common to the A_1 of this soil.

crops, but successful tiling is difficult. Too much water may be removed, causing drouthiness. Productivity is medium to low under good management (Table 30), particularly where bedrock is less than 15 to 18 inches deep. The soil is best adapted to hay and pasture crops.

Channahon silt loam (315)

Channahon silt loam is a dark, moderately well- to well-oxidized soil formed in 10 to 25 inches of medium-textured drift on level-bedded dolomitic limestone. A few inches of limestone residuum may be present in some areas, but is mostly absent in

Representative profile, Channahon silt loam



A_1 (0-11″) — A_1. Very dark brown to very dark grayish-brown (10YR 2/2-3/2) friable silt loam; weak to moderate, fine crumb structure; medium acid; gradual smooth boundary; 8 to 16 inches thick.

A_3 (11-15″) — A_3. Dark brown (10YR 3/3-4/3) friable silt loam; moderate, fine crumb to granular structure; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_2 (15-22″) — B_2. Brown (7.5YR 4/3-4/4) moderately firm silty clay loam; weak to moderate, fine to medium subangular blocky structure; neutral; abrupt smooth boundary; 6 to 16 inches thick.

R (22″+) — R. Very pale brown (10YR 7/3) bedrock dolomite.

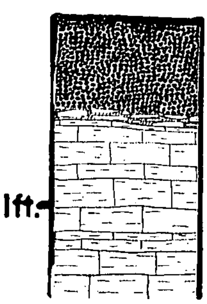
Will county. The soil developed under tall-grass prairie vegetation on gently to moderately rolling topography (1 to 10 percent slopes). It occurs along Kankakee, Des Plaines, and Du Page rivers with the principal areas lying between Kankakee and Des Plaines rivers near the western border of the county. It is classed as a Brunizem soil.

Channahon is high in organic matter, medium to slightly acid, low in available phosphorus, and medium to low in available potassium. Water-holding capacity is high in the material above the bedrock but because this material is relatively thin the total amount of water available to plants is low and the soil is drouthy. Productivity is medium to low even under good management (Table 30), particularly where bedrock is less than 15 to 18 inches deep. In a few areas bedrock is as deep as 30 inches.

Romeo silt loam (316)

Romeo silt loam is a dark, very shallow soil formed in about 2 to 10 inches of medium-textured alluvial sediments on level-bedded dolomitic limestone. It is found primarily in the Des Plaines river bottom, but in Will county a few terraces and terrace-upland breaks adjacent to the Des Plaines bottom were included. Romeo is classed as an Alluvial soil. The upland and terrace breaks, however, occur on steep slopes (20 to 45 percent) and here the soil is classed as a Lithosol, although the profile is

Representative profile, Romeo silt loam



A_1 (0-6″) — A_1. Very dark brown (10YR 2/2) friable silt loam; weak to moderate, fine crumb to granular structure; neutral to calcareous; abrupt smooth boundary; 0 to 10 inches thick.

R (6″+) — R. Light brownish-gray to very pale brown (10YR 6/2-7/3) level-bedded dolomite.

In Romeo silt loam areas, the soil material is usually less than 10 inches thick on limestone bedrock, and bedrock is often exposed at the surface. (Fig. 18)

very similar in morphology to the alluvial portion. Few areas of Romeo soil can be cultivated because of shallow bedrock (Fig. 18). The soil is drouthy. Some legumes and grasses may produce fair crops of early hay or pasture, but productivity is low (Table 30).

Millsdale silty clay loam (317)

Millsdale silty clay loam is a very dark, poorly oxidized soil developed in 25 to 42 inches of medium-textured drift on level-bedded dolomitic limestone. It formed under marsh vegetation on nearly level areas (less than 1 percent slope) or in shallow depressions. It occurs as scattered areas in the western and southwestern parts of the county, primarily along Kankakee and Des Plaines rivers. It is classed as a Humic-Gley soil. A representative profile is described on page 71.

Millsdale is high in organic matter, neutral to alkaline, and low in available phosphorus and available potassium. Water-holding capacity is high in the material above bedrock. Drainage is needed for successful crop production. Productivity is high under good management (Table 30), particularly where bedrock is below 3 feet. Bedrock occurs as deep as 4 feet in some areas.

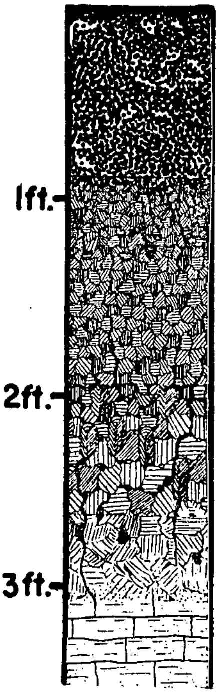
Lorenzo silt loam (318)

Lorenzo silt loam is a dark, well-oxidized Brunizem soil formed in 10 to 24 inches of medium-textured (mostly silt loam) material on calcareous loamy gravel. It developed under prairie vegetation on nearly level to moderately rolling topography (slopes of 8 percent or less). It occurs in the western and northwestern parts of the county on outwash plains and stream terraces primarily in association with Rodman, Warsaw, and Dresden soils.

Lorenzo is moderately high in organic matter, medium to slightly acid, low in available phosphorus, and low to medium in available potassium. Total water-holding capacity is low and the soil is drouthy. Permeability is moderate in the solum but very rapid in the underlying loamy gravel. Water table is deep and drainage is not needed. Productivity is fairly high for early spring crops but low for late-season crops (Table 30).

On the soil map, a complex of Lorenzo with Warsaw is shown in a number of areas in the western and northwestern parts of the county. In these areas loose

Representative profile, Millsdale silty clay loam



A_1 (0-10″)

A_1. Black (10YR 1/1-2/1) with occasional fragments of white (10YR 8/1) snail shells; friable to slightly firm silty clay loam; moderate, fine granular structure; neutral to calcareous; gradual smooth boundary; 8 to 20 inches thick.

A_3-B_1 (10-24″)

A_3-B_1. Dark gray (10YR 3/1-4/1) mottled with grayish-brown and yellowish-brown (10YR 5/2 and 5/6); firm silty clay loam to silty clay; moderate, fine to medium subangular blocky structure; neutral to calcareous; gradual smooth boundary; 4 to 12 inches thick.

B_2 (24-32″)

B_2. Grayish-brown (2.5Y 5/2) mottled with yellowish-brown (10YR 5/8); firm silty clay loam to silty clay; moderate, medium to coarse subangular blocky structure; neutral to calcareous; gradual smooth boundary; 6 to 12 inches thick.

B_3-C (32-36″)

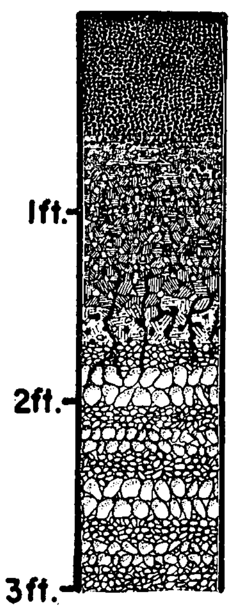
B_3-C. Grayish-brown to light brownish-gray (2.5Y 5/2-6/2) mottled with yellowish-brown (10YR 5/8); firm silty clay loam; weak, coarse subangular blocky structure to massive; calcareous; 0 to 10 or more inches thick.

R (36″+)

R. Light brown to very pale brown (10YR 7/2-7/3) dolomitic limestone.

Snail shell fragments are not common to the A_1 of this soil.

Representative profile, Lorenzo silt loam



A_1 (0-7″)

A_1. Very dark grayish-brown to dark brown (10YR 3/2 to 7.5YR 3/2) friable gritty silt loam to loam; moderate, medium crumb structure; slightly acid; clear smooth boundary; 6 to 10 inches thick.

A_3 (7-10″)

A_3. Dark brown (10YR 3/3 to 7.5YR 3/3) friable gritty heavy silt loam or loam to light clay loam; moderate, medium granular to weak, very fine subangular blocky structure; medium to slightly acid; clear smooth boundary; 2 to 5 inches thick.

B_2 (10-17″)

B_2. Brown to dark brown (7.5YR 4/4) friable to slightly firm light clay loam to sandy clay loam; weak, fine to medium subangular blocky structure; medium to slightly acid; clear smooth boundary; 5 to 10 inches thick.

IIB_3 or "Beta" (17-20″)

IIB_3. Brown to dark brown (7.5YR 4/4) friable to slightly firm loam to sandy clay loam with some small pebbles; neutral; abrupt irregular boundary; 2 to 4 inches thick.

IIC (20-36″+)

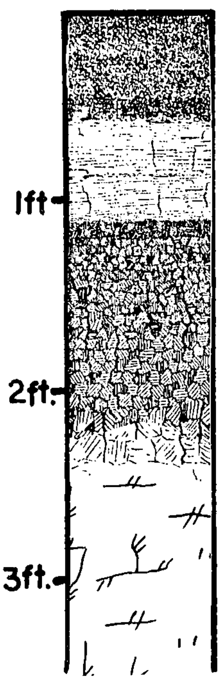
IIC. Light yellowish-brown (10YR 6/4) loose loamy gravel with varicolored rock fragments, probably 50% or more limestone and dolomite; single grain; calcareous.

calcareous loamy gravel occurs at depths varying from slightly less than 2 feet to slightly more than 2 feet within short distances. Soil features are similar to those of Lorenzo, and management practices should be similar. On the average, the areas are somewhat less drouthy than Lorenzo.

Frankfort silt loam to silty clay loam (320)

Frankfort silt loam to silty clay loam is a moderately dark, imperfectly oxidized soil formed in less than about 24 inches of loess or medium-textured drift on silty clay to clay till. Native vegetation was mixed prairie-forest or deciduous hardwood forest that encroached on prairie within relatively recent times. This type occurs on gently to moderately rolling areas (1 to 12 percent slopes) in northeastern Will county in association with Bryce soils. It is classed as an imperfectly oxidized Gray-Brown Podzolic intergrade to an imperfectly oxidized Brunizem soil. Some physical and chemical properties of a Frankfort soil are given in Table 23.

Representative profile, Frankfort silt loam to silty clay loam



A_1 (0-7″) — **A_1**. Very dark gray to very dark grayish-brown (10YR 3/1-3/2) friable silt loam to silty clay loam; weak, medium crumb structure; slightly acid; clear smooth boundary; 5 to 10 inches thick.

A_2 (7-13″) — **A_2**. Grayish-brown to brown to pale brown (10YR 5/2-5/3-6/3) friable to slightly firm silt loam to silty clay loam; weak, very fine platy structure in place, breaking to weak, very fine to fine crumb or granular; medium acid; clear smooth boundary; 3 to 6 inches thick.

B_1 (13-15″) — **B_1**. Mixed brown, light brownish-gray, and pale brown (10YR 5/3, 6/2, 6/3) firm silty clay loam to silty clay; moderate, very fine to fine subangular to angular blocky structure with thin gray (10YR 6/1) silty coatings; slightly acid; clear smooth boundary; 0 to 6 inches thick.

B_2 (15-25″) — **B_2**. Dark grayish-brown (10YR 4/2) mottled with light olive brown (2.5Y 5/4-5/6); very firm silty clay; strong, fine to medium angular blocky structure with thin dark clay films; clear smooth boundary; 5 to 15 inches thick.

C (25-40″+) — **C**. Gray (5Y 5/1) to light brownish-gray (10YR 6/2) mottled with light olive brown (2.5Y 5/3-5/4); very firm silty clay; moderate, medium to coarse angular blocky structure to massive; calcareous.

In Will county, Frankfort includes some areas of the moderately well oxidized catena associate.

Table 23. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF FRANKFORT SILT LOAM TO SILTY CLAY LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_p	0–6	.5	17.6	48.1	34.3	...[c]	...	...	...	...	5.8	2.42
B_1	6–12	2.0	17.2	42.8	40.0	...	...	...	...	...	6.0	1.62
B_2	12–22	.5	7.6	33.2	59.2	...	...	...	...	...	6.6	.86
C	22–30+	2.0	10.5	46.6	42.9	...	...	...	...	...	8.0	.30

[a] Will County, T.35N, R.12E, Sec. 29, SE ¼, SW 40, SW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0-.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.

Frankfort is medium in organic matter, medium to slightly acid, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high but moisture movement is slow to very slow, particularly in the unleached till. Drainage is needed in many of the areas with slopes of less than 2 or 3 percent. But adequate drainage is difficult to obtain because of slow permeability. Productivity is medium where the soil is well managed and properly fertilized (Table 30). Severely eroded areas are unproductive, and satisfactory stands of legumes, grasses, or trees are nearly impossible to obtain (Fig. 16).

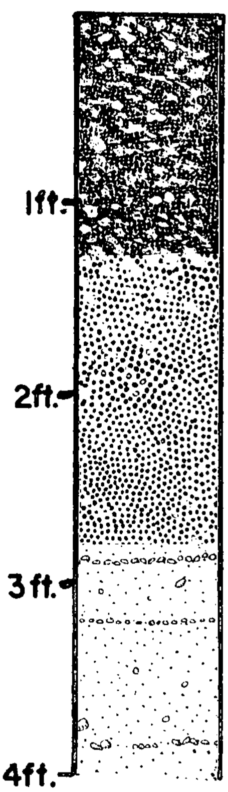
Du Page silt loam (321)

Du Page silt loam is a dark, imperfectly to moderately well-oxidized soil formed in medium-textured alluvial sediments that were either originally calcareous or accumulated large amounts of snail shells and shell fragments during deposition. Native vegetation was prairie, sometimes with scattered trees or shrubs. The soil occurs primarily in Du Page river bottom. It is classed as an Alluvial soil.

Du Page soil is high in organic matter, calcareous, and low in available phosphorus and potassium. Drainage may be needed in some areas for grain farming. Periodic flooding is a hazard but productivity is high where the soil is properly fertilized and otherwise well managed (Table 30). Pasture is the best use for many areas, particularly those that are flooded seasonally.

Limestone should not be applied and rock phosphate is ineffective in this calcareous soil.

Representative profile, Du Page silt loam



A_1 (0-15")

A_1. Black to very dark brown (10YR 2/1-2/2) with abundant white (10YR 8/1) snail shell fragments; friable silt loam; moderate, fine to medium crumb or soft granular structure; calcareous; gradual smooth boundary; 10 to 30 or more inches thick.

A_{3-1} (15-33")

A_{3-1}. Very dark grayish-brown to dark brown (10YR 3/2-3/3), with abundant light gray to white (10YR 7/1-8/2) snail shell fragments; friable silt loam; massive; calcareous; gradual smooth boundary; 10 to 30 or more inches thick.

A_{3-2} (33-48"+)

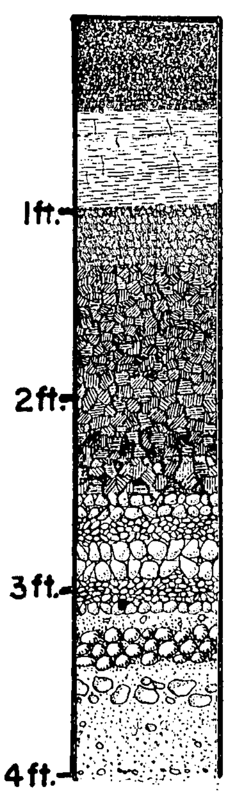
A_{3-2}. Brown to dark yellowish-brown (10YR 4/3-4/4) faintly mottled with dark gray to dark grayish-brown (2.5Y 4/1-4/2); friable stratified loam, silt loam, sandy loam, and occasional fine gravel; massive; calcareous.

Dresden silt loam (325)

This moderately dark, well-oxidized soil was formed in 2 to 3½ feet of medium-textured material on calcareous loamy gravel. Native vegetation was mixed prairie-forest or forest that had encroached on prairie within recent times. Dresden occupies nearly level to moderately rolling topography (slopes of 7 percent or less), and occurs in the western and northwestern parts of the county, primarily in association with Warsaw, Fox, and Homer soils. It is classed as a Gray-Brown Podzolic intergrade to Brunizem soil.

Dresden is moderately low in organic matter, about medium acid, low in available phosphorus, and medium in available potassium. The solum has high water-holding capacity and moderate permeability. In the underlying loamy gravel, however, water-holding capacity is very low and permeability very rapid. The soil is therefore moderately drouthy. Drainage is not needed since the natural water table is deep. Productivity is moderately high under good management and treatment (Table 30), but is somewhat low when the soil is untreated.

Representative profile, Dresden silt loam



A_1 (0-6″) — A_1. Very dark brown to very dark grayish-brown (10YR 2/2 to 3/2) friable silt loam; weak, fine crumb to granular structure; medium acid; abrupt smooth boundary; 5 to 10 inches thick.

A_2 (6-12″) — A_2. Dark grayish-brown (10YR 4/2) very friable silt loam; weak, fine platy structure; medium to strongly acid; abrupt smooth boundary; 2 to 8 inches thick.

B_1 (12-17″) — B_1. Dark yellowish-brown (10YR 4/4) slightly firm gritty silty clay loam; moderate, very fine subangular blocky structure with some thin coatings of light gray silt; medium to strongly acid; clear smooth boundary; 3 to 6 inches thick.

B_2 (17-26″) — B_2. Dark yellowish-brown (10YR 4/4) firm gritty silty clay loam to clay loam; moderate, medium subangular blocky structure with some thin dark clay films; medium acid; clear smooth boundary; 6 to 15 inches thick.

IIB_3 or "Beta" (26-29″) — IIB_3. Dark yellowish-brown (10YR 4/4) slightly firm gravelly clay loam; very coarse blocky structure to massive; neutral to weakly alkaline; abrupt irregular boundary; 2 to 5 inches thick.

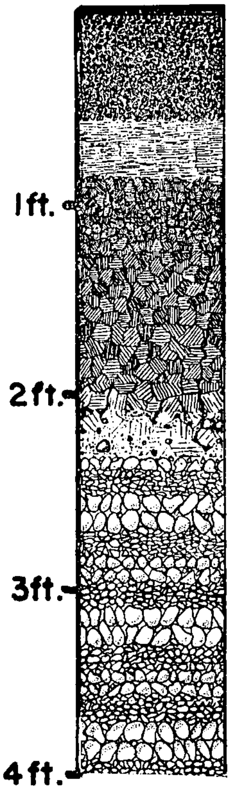
IIC (29-48″+) — IIC. Primarily light yellowish-brown (10YR 6/4) loose loamy gravel with varicolored rock fragments of which many are limestone and dolomite; single grain; calcareous.

The profile described here represents the better drained portion of this soil as mapped in Will county.

Homer silt loam (326)

Homer silt loam is a light-colored, imperfectly oxidized Gray-Brown Podzolic soil formed from 2 to 3½ feet of medium-textured sediments on calcareous loamy gravel. It developed under deciduous hardwood forest in shallow upland drainageways or depressions with a fluctuating water table. It occurs in the western part of the

Representative profile, Homer silt loam



A_p (0-7″) — **A_p.** Dark grayish-brown (10YR 4/2) friable silt loam; weak, fine crumb to granular structure; medium acid; abrupt smooth boundary. A_1 varies from 1 to 5 inches in thickness in unplowed areas.

A_2 (7-10″) — **A_2.** Grayish-brown to light brownish-gray (10YR 5/2-6/2) friable silt loam; very weak, fine platy structure breaking to weak, fine crumb; medium acid; abrupt smooth boundary; 2 to 6 inches thick.

B_1 (10-15″) — **B_1.** Yellowish-brown (10YR 5/4) mottled with dark grayish-brown (10YR 4/2); slightly firm clay loam to silty clay loam; moderate, fine subangular blocky structure; medium acid; clear smooth boundary; 0 to 6 inches thick.

B_2 (15-27″) — **B_2.** Yellowish-brown (10YR 5/4) mottled with very dark grayish-brown (10YR 3/2); firm gritty silty clay loam to clay loam; moderate, fine to medium subangular blocky structure with some very dark brown (10YR 2/2) clay-humus coatings; neutral; abrupt smooth boundary; 8 to 16 inches thick.

IIC (27-50″+) — **IIC.** Very pale brown (10YR 7/3) and brown (10YR 5/3) friable to loose loamy gravel with varicolored rock fragments; stratified; calcareous.

Included with Homer in Will county were a few areas of prairie-forest transition soils with darker A_p or thicker A_1 horizons than described here.

county, primarily near Du Page river in association with Fox, Warsaw, and Troxel soils.

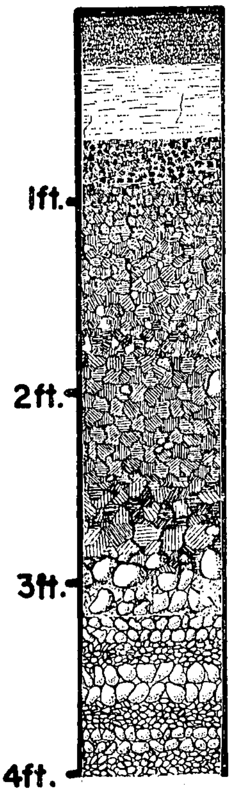
Homer is low in organic matter, medium acid, low in available phosphorus, and low to medium in available potassium. Water-holding capacity is high in the medium-textured upper solum but low in the underlying gravel. Although drainage is needed for good crop growth, the water table must not be lowered much below 3 feet or the soil will be drouthy. Productivity is medium to moderately high under good management (Table 30).

Fox silt loam (327)

Fox silt loam is a light-colored, well-oxidized soil formed in 2 to 3½ feet of medium-textured material on calcareous loamy gravel. It developed under forest vegetation on nearly level to moderately rolling topography (slopes of 10 percent or less). It occurs primarily in the western and northwestern parts of the county in association with Dresden, Warsaw, and Will soils. It is classed as a Gray-Brown Podzolic soil. Some physical and chemical properties of a Fox soil are given in Table 24.

Fox is low in organic matter, about medium acid, low in available phosphorus, and medium in available potassium. Water-holding capacity is high in the solum but very low in the underlying loamy gravel. Permeability is moderate in the solum and very rapid in the loamy gravel. The natural water table is deep, so drainage is not needed. The soil is moderately drouthy. In years of favorable rainfall productivity is moderately high where the soil is properly fertilized and otherwise well managed (Table 30).

Representative profile, Fox silt loam



A1 (0-3″) A1. Very dark brown (10YR 2/2) friable silt loam; weak, fine crumb structure; slightly acid; abrupt smooth boundary; 1 to 5 inches thick.

A2 (3-8″) A2. Brown (10YR 5/3 to 7.5YR 4/3-5/3) very friable light silt loam; weak, fine platy structure; medium acid; clear smooth boundary; 5 to 10 inches thick.

A3 (8-11″) A3. Dark brown (7.5YR 3/4-4/4) very friable silt loam; weak, medium granular structure; medium acid; clear smooth boundary; 0 to 5 inches thick.

B1 (11-14″) B1. Brown (7.5YR 4/4-5/4) slightly firm gritty light silty clay loam; moderate, fine subangular blocky structure with thin sprinkling of light gray coatings; medium acid; clear smooth boundary; 2 to 5 inches thick.

B2 (14-30″) B2. Brown (7.5YR 4/4) firm clay loam with a few small pebbles; moderate, medium subangular blocky structure; medium acid; abrupt wavy boundary; 10 to 20 inches thick.

IIB3 or "Beta" (30-36″) IIB3. Dark brown to dark reddish-brown (7.5YR 3/4-4/4 to 5YR 3/4) moderately firm to friable fine gravelly clay loam to gravelly loam; weak, coarse blocky structure to single grain; neutral; abrupt irregular boundary; 3 to 15 inches thick.

IIC (36-48″+) IIC. Light yellowish-brown (10YR 6/4) loose loamy gravel with varicolored rock fragments of which many are limestone and dolomite; stratified; calcareous.

Table 24. — PARTICLE SIZE DISTRIBUTION AND SOME CHEMICAL ANALYSES OF FOX LOAM TO SILT LOAM[a]

Horizon	Depth	Particle size distribution[b]				Exchangeable cations			Cation exchange capacity	Base saturation	pH	Organic carbon
		Gravel	Sand	Silt	Clay	Ca	Mg	K				
	in.	*pct.*	*pct.*	*pct.*	*pct.*	*me. per 100 gm. soil*				*pct.*		*pct.*
A_1	0–3	.1	45.7	44.0	10.3	...[c]	...	...	13.3	96	6.7	4.43
A_2	3–7	.1	47.1	43.3	9.6	...	...	...	6.9	86	6.1	1.27
A_3	7–9	.1	45.2	42.0	12.8	...	...	...	7.8	82	5.7	.78
B_1	9–13	.1	46.8	33.7	19.5	...	...	...	12.0	88	5.5	.68
B_{2-1}	13–21	2.4	48.1	24.4	27.5	...	...	...	17.4	80	5.2	.64
B_{2-2}	21–27	7.4	61.5	9.6	28.9	...	...	...	17.8	86	5.3	.46
B_{2-3}	27–30	20.2	63.2	9.8	27.0	...	...	...	16.1	94	5.5	.43
B_3	30–37	60.3	69.6	13.7	16.7	...	...	...	....	..	7.4	....
C	37–50	61.8	85.8	10.6	3.6	...	...	...	....	..	7.8	....

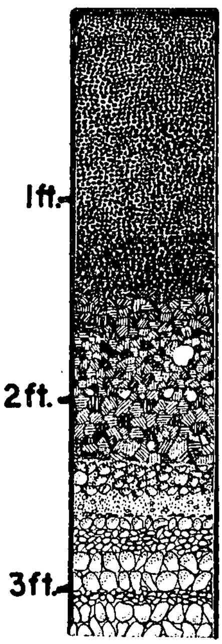
[a] McHenry County, T.44N, R.9E, Sec. 6, NE ¼, SE 40, NW 10 acres.
[b] Gravel is material >2.0 mm.; sand, 2.0–.05 mm.; silt, .05-.002 mm.; clay, <.002 mm. Percentages for gravel are based on entire sample; those for other particle sizes are based on material <2.0 mm.
[c] Not determined.
Note that particle size distribution of this soil indicates a loam-textured A, B_1, and B_3 and a sandy clay loam-textured B_2.

Will silty clay loam (329)

Will silty clay loam is a very dark, poorly oxidized Humic-Gley soil formed in 2 to 3½ feet of moderately fine-textured sediments on calcareous loamy gravel to gravel. It developed under marsh vegetation in upland drainageways or depressions where the water table was kept at or near the surface by topographic position or distance to drainage outlet. It occurs primarily in the western part of the county in association with Warsaw, Lorenzo, and Fox soils.

Will is high in organic matter, slightly acid to neutral, low in available phosphorus, and medium in available potassium. Water-holding capacity in the moderately fine-textured upper solum is high but in the underlying gravel it is very low. Although drainage is needed, the water table should not be lowered deeply into the gravel or the soil will become drouthy for many crops. Productivity is high under good management (Table 30). In a few areas gravelly material is only 15 or 16 inches from the surface and average crop yields will be lower than those in Table 30.

Representative profile, Will silty clay loam



A_1 (0-14")

A_1. Black to very dark brown (10YR 1/1-2/1 to 2/2) slightly firm silty clay loam; moderate, fine to medium granular structure; slightly acid; gradual smooth boundary; 10 to 16 inches thick.

A_3 (14-18")

A_3. Very dark brown (10YR 2/2) slightly firm silty clay loam with a few sand grains and small pebbles; moderate, medium to coarse granular to fine subangular blocky structure; slightly acid; gradual smooth boundary; 3 to 6 inches thick.

B_2 (18-28")

B_2. Very dark grayish-brown to dark grayish-brown (10YR 3/2-4/2) firm silty clay loam with a few small pebbles; moderate, fine to medium subangular blocky structure; neutral; abrupt smooth boundary; 8 to 15 inches thick.

IIC (28-50"+)

IIC. Grayish-brown to light brownish-gray (10YR 5/2-6/2) friable to loose loamy gravel with varicolored rock fragments of which many are limestone and dolomite; calcareous.

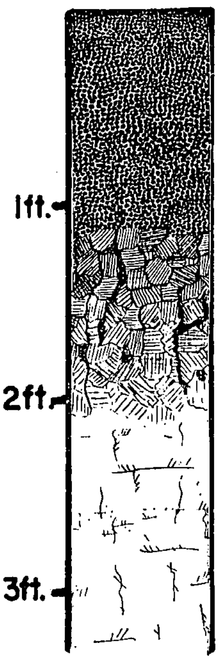
Peotone silty clay loam (330)

Peotone silty clay loam is a very dark, very poorly oxidized soil formed in moderately fine-textured material, mostly local slopewash. It developed under very wet marsh conditions in depressions that had no natural surface outlet (Fig. 15). It occurs as small scattered areas in various parts of the county, primarily in association with Ashkum and Drummer. Peotone is classed as a Humic-Gley soil.

This type is high in organic matter, neutral, low in available phosphorus, and about medium in available potassium. Water-holding capacity is high and permeability is moderately slow. Drainage is needed but tile function slowly. Water

often accumulates after heavy rainfall and remains long enough to drown out most crops. Surface drainage or open inlets into tile systems are usually effective if outlets are obtainable. Productivity is moderate to moderately high where the soil is adequately drained and otherwise well managed (Table 30).

Representative profile, Peotone silty clay loam



A_1 (0-14″) — **A_1.** Black (10YR 1/1-2/1-N 2/0) firm silty clay loam; moderate, medium crumb or granular to irregular fine blocky structure; slightly acid to neutral; gradual smooth boundary; 8 to 20 inches or more thick.

A_3-B (14-24″) — **A_3-B.** Black to very dark gray (10YR 2/1-3/1) firm silty clay loam; weak, coarse irregular blocky structure; neutral; gradual smooth boundary.

C (24-40″+) — **C.** Very dark gray to dark gray (N 3/0-10YR 4/1) with occasional mottles of brown (10YR 5/3); moderately firm silty clay loam to silt loam; massive; neutral to alkaline.

One to several krotovinas per square foot extend to a depth of 4 feet or more in areas of this soil.

GENESIS, DEVELOPMENT, AND CLASSIFICATION OF WILL COUNTY SOILS

Factors of Soil Formation

The soils of Will county were developed from parent materials by the action of climatic forces, together with plants, animals, and their residues. Topography, or relief, and depth to water table indirectly affected soil formation by influencing aeration and drainage. In general, the length of time that parent materials were subjected to these forces determined the degree to which the present soils are weathered and developed.

Parent materials were distributed by the action of ice, water, and wind. During the glacial epoch several glaciers advanced across the region now occupied by Will county. These glaciers (Fig. 5) not only removed old soils, but also deposited large amounts of freshly ground-up rock materials, in which our present-day soils are formed. Some of these materials were not sorted, but were deposited as unstratified till. Other materials were sorted by water flowing from the melting glaciers. These are known as outwash or as lacustrine sediments. And finally a thin surficial covering of silt loam (loess) was blown onto most of the till and outwash areas.

Thickness of glacial drift (till, outwash, and loess) varies greatly. Bedrock outcrops are common along Des Plaines

and Kankakee rivers, particularly in the stream bottoms and along some of the bluffs. Much of the northern and eastern parts of the county are covered with 100 to 150 feet or more of till. Outwash covers much of the southwestern part to depths of 10 to 20 feet and more. Also, some sandy and gravelly outwash lies beneath several feet of till in many parts of the county (*7*). The surface cover of loess is mostly less than 2 feet thick and is probably not more than about 1 foot thick in the extreme eastern part. Because all the moraines (page 6) and intermorainal areas are classed as Cary age (*11*), all surficial loess is of Cary age or younger. This is considered Late Wisconsin.

The unstratified tills in Will county may be divided into three general groups according to the proportions of gravel, sand, silt, and clay (Table 25). Differences in these proportions are reflected in the texture and permeability of the tills, which, in turn, have influenced and continue to influence soil development.

Till of loam texture (Table 25) occupies much of the northwestern corner of the county. It is moderately permeable to air and water and is considered a more desirable soil parent material than tills of either coarser or finer texture.

The most extensive soil parent material in Will county is till of silty clay loam texture, which occupies most of the central and eastern portions of the county. It is somewhat slowly permeable to air and water, and plant roots do not readily penetrate more than a few inches into the unleached till.

An area of silty clay till occurs in the northeastern part of the county. Because of the high percentages of silt and clay, permeability is very slow, and plant roots seldom penetrate the unleached till except in cracks or along cleavage faces.

Some loamy gravel occurs on a relatively high ridge in sections 27, 28, 29, 30, and 31, T.37N, R.10E (Du Page township) and extending into section 36, T.37N., R.9E (Wheatland township). This material may be classed as till although some of it may have been sorted by water.

Outwash materials were deposited by water flowing at different rates down streams, across outwash plains, or into lakes. The variation in water flow resulted in strata of different textures and thickness. Outwash materials thus vary from coarse, nearly clean gravel to very fine, nearly pure clay. Usually, however, they are mixtures of two or more particle sizes.

Medium-textured outwash (loam and silt loam textures) occurs along most of the important streams in all parts of the county. It is excellent soil-forming material, comparing favorably with loam-textured till.

Large areas of sandy and gravelly outwash occur along Du Page, Des Plaines, and Kankakee rivers, including most of

Table 25. — PERCENTAGES OF GRAVEL, SAND, SILT, AND CLAY IN THE THREE IMPORTANT TEXTURES OF CALCAREOUS GLACIAL TILL IN WILL COUNTY

Texture of glacial till	Average or range	Gravel (>2 mm.)	Sand (2–.05 mm.)	Silt (.05–.002 mm.)	Clay (<.002 mm.)
		perct.	*perct.*	*perct.*	*perct.*
Loam and silt loam	Average	7.5	24.0	47.8	20.7
	Range	4.3–16.2	14.0–39.3	36.5–54.2	14.3–25.5
Silty clay loam	Average	4.1	12.0	52.6	31.3
	Range	0–14.0	3.8–16.3	45.5–65.1	24.2–36.4
Silty clay	Average	2.8	10.0	47.5	39.7
	Range	0–6.7	1.4–15.9	38.9–53.6	34.7–44.9

Table 26. — WILL COUNTY SOIL SERIES: ARRANGED ACCORDING TO SOIL ASSOCIATION, B HORIZON DEVELOPMENT, PARENT MATERIAL OF SOLUM, AND MATERIAL OF C O

Soil assoc. area[a]	Profile oxidation (natural drainage) class					Native[b] vegetation
	Well	Moderately well	Imperfect	Poor	Very poor	
I and II	Hennepin (25)					Forest
	Miami (24)					Forest
			Herbert (62)			P.-F.
	Saybrook (145)	Saybrook (145)	Lisbon (59)	Drummer (152)[d]	Peotone (330)[d]	Prairie
III	Chatsworth (241)	Chatsworth (241)				P. or F.
	Morley (194)	Morley (194)	Blount (23)			Forest
IV and V			Beecher (298)			P.-F.
			Elliott (146)	Ashkum (232)[d]	Peotone (330)[d]	Prairie
VI	Symerton (294)	Symerton (294)	Andres (293)			Prairie
VII	Chatsworth (241)	Chatsworth (241)				P. or F.
			Eylar (228)			Forest
			Frankfort (320)			P.-F.
				Bryce (235)[d]	Rantoul (238)[d]	Prairie
			Mokena (295)			Prairie
VIII				Harpster (67)		Prairie
	Camden (134)	Camden (134)	Starks (132)			Forest
			Millbrook (219)			P.-F.
	Alexis (80)	Proctor (148)	Brenton (149)	Drummer (152)		Prairie
				Thorp (206)		Prairie
			La Hogue (102)			Prairie
			Martinton (189)	Milford (69)		Prairie

IX	(93) Rodman (313)					P. or F.
	Lorenzo (318)					Prairie
	Fox (327)		Homer (326)			Forest
			Dresden (325)			P.-F.
	Warsaw (290)			Will (329)		Prairie
	Troxel (197)	Troxel (197)				Prairie
X	Alvin (131)		Woodland (20)			Forest
XI	Hagener (88)		Watseka (49)	Maumee (89)		Prairie
	Onarga (190)		Ridgeville (151)	Pittwood (130)		Prairie
				Harpster (196)		Prairie
	Rankin (157)					Prairie
XII	Plainfield (54)					Forest
	Oquawka (270)					P.-F.
XIII	Romeo (316)	Romeo (316)	Romeo (316)	Romeo (316)		P. or F.
	Ritchey (311)					Forest
	Channahon (315)			Joliet (314)		Prairie
			Plattville (220)	Millsdale (317)		Prairie
XIV		Du Page (321)		Millington (82)		Prairie
	Huntsville (73)	Huntsville (73)				Prairie
Nearly all areas					Houghton (103)	Prairie
					Lena (210)	Prairie

[a] The soil series shown for each association are the dominant soils in the area.

[b] P. = prairie; F. = forest; P.-F. = a combination of prairie and forest vegetation or a relatively recent encroachment of one ... vegetation are included with prairie.

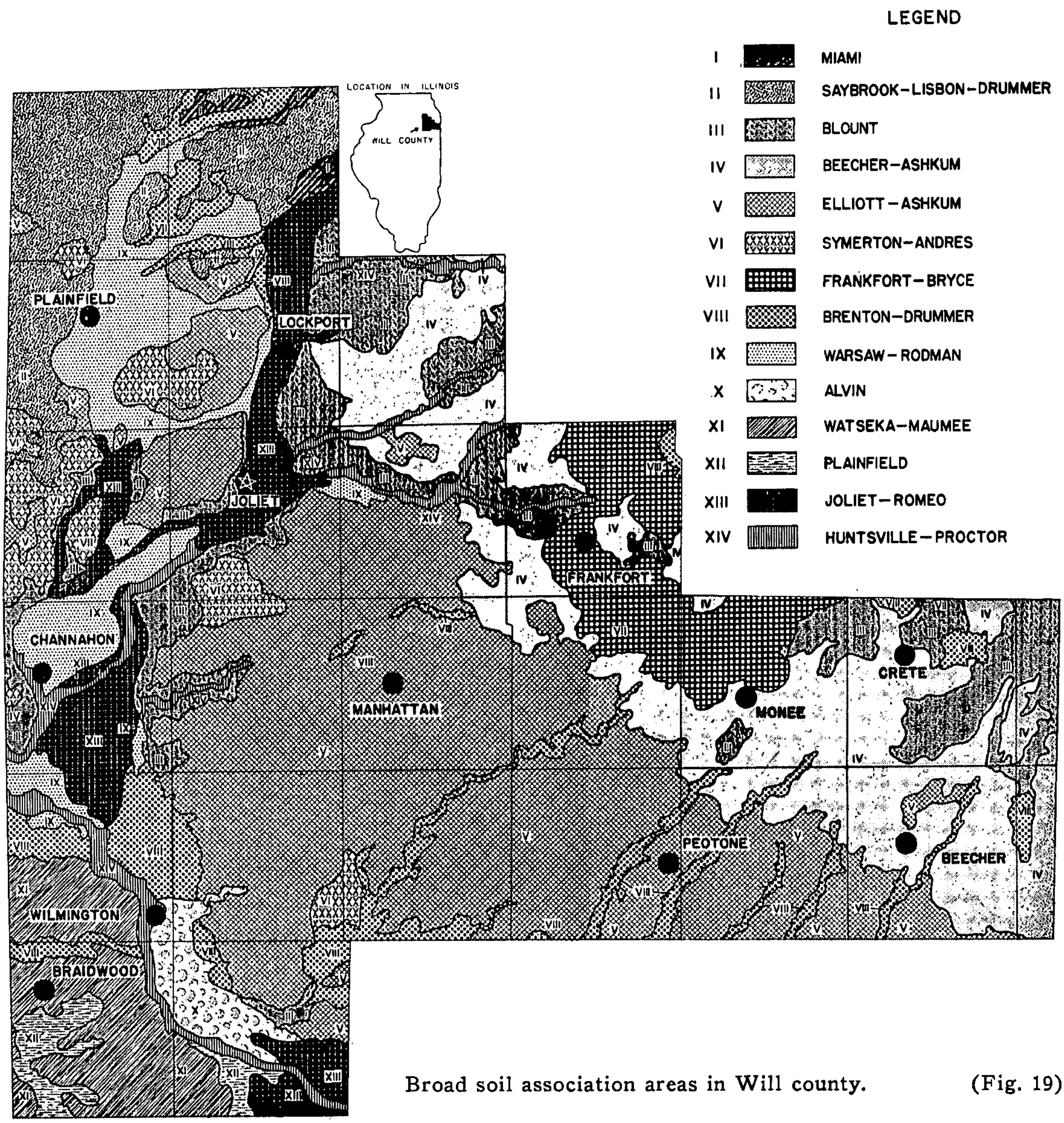
[c] Degree of B horizon development is based primarily on clay accumulation. Weak = little or no textural B or a moderate B ... addition to that in parent material; strong = considerable clay accumulation in addition to that in parent material. Some Humic-... soils.

[d] Up to 40 inches of outwash or local slopewash may form the parent material of these soils.

the southwestern corner of the county (*5*). These are much less desirable soil parent materials than outwash of loam and silt loam textures. Fortunately for agriculture, a large portion of the gravel is covered with 1 or more feet of medium-textured material.

Fine-textured lacustrine or lakebed sediments occur in three minor areas. Two are in the northeast — one at Steger and the other about 4 miles northeast of Frankfort. The third is a group of small areas of types numbered 69 and 189 about 5 miles northwest of Wilmington. These latter appear to be remnants of a former larger lakebed area.

Loess consists mainly of silt with a little clay. It originated from areas barren of vegetation and exposed to wind currents which could separate the fine particles from coarser fragments. These areas were usually large bottomlands and valley trains of glacial rivers. Although some loess was undoubtedly deposited



Broad soil association areas in Will county. (Fig. 19)

before the later glacier movements, only that deposited on top of the last or uppermost till and outwash is important to the modern soils. Because loess is present as the surface material, it is responsible for silt loam textures in the A horizons of about half the soil types in Will county.

Figure 19 outlines the general soil association areas derived from till and outwash of various textures. The parent materials of the sola of the soil series mapped in Will county, as well as the nature of the underlying materials, are given in Table 26.

Climate is important in soil development because it largely determines the type of weathering that takes place. Most years this region has enough rainfall and melted snowfall to moisten all soil and underlying materials to bedrock or to the permanent water table. Degree of saturation is variable, depending on thickness and permeability of unconsolidated materials, their water-holding capacity, and topography.

In general rainfall either percolates downward to underground outlets, evaporates, is transpired by plants, or moves across the land surface to streams, carrying with it material in solution and suspension. Salts of calcium, magnesium, potassium, and other bases, as well as various organic and inorganic colloids, are formed. Some accumulate where formed, some are carried away in drainage waters, some are moved to other parts of the soil section to help form soil horizons, and some, in the form of nutrient ions, are taken up by plants. The latter tend to be returned to the local soil area unless removed by animals or humans.

Freezing and thawing help to break down rock fragments to smaller and smaller particles while the action of sun and wind influences many phases of plant and animal life.

Native vegetation, including all associated plant and animal life, was responsible for the accumulation of organic matter. Two kinds, tall-grass prairie and deciduous forest, were present when Will county was settled and presumably had been there for a long time. Both types of vegetation produced large amounts of organic matter. However, forest debris accumulated primarily on the soil surface, where most of it decayed rapidly or was burned or eroded away. A relatively small amount was carried by soil organisms into the upper 1 to 5 inches of mineral soil, where it was partially preserved. On the other hand, the organic matter that accumulated from the decaying fibrous root systems of prairie grasses was within the mineral soil and was well preserved.

In the virgin or uncultivated state, soils that developed under both types of vegetation have dark A_1 horizons, due to an accumulation of organic matter. However, the dark layer is much thicker in prairie soils, usually varying between 10 and 15 inches. In soils developed under forest, the A_1 horizon is generally 1 to 5 inches thick. Where the two types of vegetation were combined or where forest was encroaching on prairie, the A_1 is 5 to 10 inches thick. Peats and mucks often have an accumulation of organic matter several feet deep.

Drainage conditions determine the degree to which certain mineral compounds are oxidized. This in turn determines the color of the subsoil. In permeable materials, where the water table is deep, the soil profile is well oxidized and the overall subsoil colors are mostly brown to yellowish-brown, centering primarily around 10YR 5/4-5/6. In very slowly permeable materials or where the permanent water table is shallow, the soil profile is poorly oxidized and the overall subsoil colors are mostly gray, centering primarily around 2.5Y 5/1. Between these extremes, or where the water table fluctuates slowly into and out of the soil profiles, they are moderately well to imperfectly oxidized, with mixed or mottled colors.

In Will county, drainage conditions depend primarily upon texture and com-

pactness of the soil parent material, as well as depth to drainage outlets. Relief and slope are of some importance in that they influence runoff and depth to water table.

Time is an important factor in soil formation. The longer soils weather, the more distinctive are their horizons and profiles. However, soil weathering and development cannot always be measured directly in years, because other factors determine the degree to which a profile develops within a given time. Unconsolidated materials weather faster than solid bedrock, so that a soil profile developed from the former materials will reach a certain stage of development sooner than a soil developed from bedrock. Yet the profile of each soil becomes more strongly weathered and developed with the passing of time.

Man in our modern world must also be considered a factor in soil formation and development. He harvests the native vegetation and plows the land. By cultivating slopes, he hastens erosion and deposition. He drains wet soil areas and irrigates dry ones. Where soils are acid, he applies crushed limestone; where plant nutrients are depleted, he applies fertilizing materials. And through much excavating, grading, and filling, he completely covers or destroys the presently developed soil profile and causes a new cycle of soil formation to begin.

Soil Development

In the geological time scale the soils of Will county are young. They are developed in materials deposited during Cary time (*11*) or later. Organic materials found associated with till and outwash of Cary time show a radiocarbon age of approximately 13,000 years (*12, 18, 20*). But estimates based on geological evidence, such as varve accumulations, wave cutting, depth of leaching, and mineralogy, indicate that Cary age materials were deposited approximately 25,000 years ago (*4*). Both are considered short geological periods.

Regardless of the actual number of years that have passed, the soils range from very weakly developed or undeveloped to moderately well developed. Soils on steep slopes, which are subject to continued erosion, have weakly developed profiles. Those in slight depressions with a deep water table have relatively well-developed profiles because most or all rainfall moves downward.

In addition to the many readily observable features, the net effect of the prevailing climate is to leach out bases, iron, and aluminum from the solum and to form clay. As bases leach out and are replaced by hydrogen, soils become acid. As iron and aluminum move out, silicon increases proportionately. As clay is formed and accumulates, it imparts properties which differ significantly from those of the original material. This is particularly evident in soils with well-developed B horizons.

Clay Mineralogy

The major horizons of some till-derived soils in Will and neighboring counties have been analyzed for clay minerals (*26*), although this analysis has not been made for soils derived from outwash. Where loess was a surface deposit, horizons derived from it were analyzed as part of the till-derived soils.

The four most important clay minerals found were illite, montmorillonite, vermiculite, and chlorite (Table 27). Kaolinite was indicated in most samples, but in amounts too small to be measured by the method used. Following is a summary of the results for 54 samples of 10 soil types that occur in Will county.

Horizon	A_1	A_2	B	C
Number of samples	16	6	16	16
Samples in which illite predominated	13	4	8	15
Samples in which montmorillonite predominated	1	1	7	0
Samples in which montmorillonite equaled illite	2	1	1	1
Samples in which vermiculite predominated	0	0	0	1
Samples in which vermiculite was greater than montmorillonite	4	1	5	9
Samples in which chlorite predominated	0	0	0	0
Samples in which chlorite was greater than montmorillonite	4	1	0	9

Illite was generally the most abundant clay mineral. It is a relatively nonexpanding type with low swelling properties.

Montmorillonite is the most active clay mineral, chemically and physically (*22*). It is a highly expanding type capable of absorbing large amounts of water. It swells and shrinks considerably more with changes in moisture than do other clay minerals. It is the predominant clay mineral in loess (*3*) and is moving from the loessial surface horizons into the till B horizons as weathering progresses. It also forms from other clay minerals in these horizons. It predominated in 7 of the 16 B horizon samples analyzed. No montmorillonite was found in 8 of the C horizon samples and relatively little was found in the other C horizons.

Vermiculite has limited swelling properties, probably intermediate between illite and montmorillonite. It was the predominant mineral in one sample (a calcareous till C horizon) and was more abundant than montmorillonite in 19 others. It was not more abundant than illite in any sample except the one C horizon sample.

Chlorite has low swelling properties. It was not the most abundant clay mineral in any sample analyzed; nor was it more abundant than illite in any sample. It was, however, more abundant than montmorillonite in 4 A_1, 1 A_2, and 9 C samples; and was nearly equal to montmorillonite in 5 B horizon samples. It was about equal to vermiculite, varying from slightly less to slightly more, in all except 2 A_1 samples, where no chlorite was found.

Taxonomic Classification of Will County Soils

The taxonomic classification of soils is based primarily on readily observable or otherwise easily detectable profile characteristics. It includes all such morphological features as kind, thickness, and arrangement of horizons, including their color, texture, structure, reaction, consistence, mineralogy, and chemical composition.

As shown in Table 28, Will county soils are classified into nine Great Soil Groups (*24*). This is the system used throughout the detailed soil type descriptions (pages 13 to 78). However, a broader, more comprehensive system of classifying soils is now being developed. In Table 29 and in the following discussion, a system for Will county soils is presented that is designed to fit into the new system insofar as our present knowledge permits.

Soil type. The soil type is the lowest category used in this report. It is the unit about which the most detail can be observed and the most accurate predictions can be made. Each type differs from all other types in one or more features but tends to grade into the surrounding types at its outer margins. Its lower limit is the depth to which natural soil-forming factors are operative or the depth to which roots of native plants penetrate, whichever is deeper. Soil types are not included in Table 29.

Series. A soil series is a group of soil types which are similar in kind and ar-

Table 27. — CLAY MINERALOGY OF THE MAJOR HORIZONS OF CERTAIN SOIL TYPES OCCURRING IN WILL COUNTY

Soil type	Horizon	Relative amounts[a] of: Illite	Montmorillonite	Chlorite	Vermiculite
Fox silt loam	A_1	M	S	T	S
	A_2	S	M	T	S
	B_2	S	L	T	S
	Calcareous gravel	S	S	T	M
Miami silt loam	A_1	M	T	S	S
	A_2	M	S	S	T
	B_2	M	S	T	S
	Calcareous till	L	O	T	T
Blount silt loam	A_p	L	T	S	T
	A_2	L	T	T	T
	B_2	M	S	T	S
	Calcareous till	L	O	S	T
Eylar silt loam	A_1	L	O	S	O
	A_2	L	T	S	T
	B_2	L	T	T	S
	Calcareous till	L	O	T	T
Warsaw silt loam	A_1	M	M	T	T
	B_2	M	M	T	T
	Calcareous gravel	M	S	T	T
Saybrook silt loam	A_1	M	M	O	T
	B_2	S	L	T	T
	Calcareous till	L	T	T	O
Elliott silt loam	A_1	L	T	O	T
	B_2	L	T	T	S
	Calcareous till	L	T	T	T
Drummer silty clay loam	A_1	S	M	T	T
	B_2	S	L	T	T
	Calcareous till	L	S	T	T
Ashkum silty clay loam	A_1	L	S	T	T
	B_1	S	L	T	T
	Calcareous till	L	O	T	T
Bryce silty clay loam	A_1	M	S	S	S
	B_1	S	M	T	T
	Calcareous till	L	O	S	T

[a] Symbols used to indicate relative amounts of clay minerals are: L = large amount (60-100 percent), M = moderate amount (35-60 percent), S = slight amount (15-35 percent), T = trace (5-15 percent); 0 = none or amount too small to identify.

rangement of differentiating characteristics, including parent material, but which vary in texture of the surface layer. All but two series in Will county are composed of a single type. This is due partly to the thinness of the surface loess or other silty sediment and partly to definite variations in parent soil material which are reflected by differences in surface texture. Series is the lowest grouping of soils in Table 29.

Family. Series are grouped into families according to properties that affect the development of plant roots and the movement and retention of soil moisture. The principal properties considered are thickness of solum and texture of A and B horizons. Some families may be considered soil management groupings, although others are primarily taxonomic and may include soils requiring somewhat different management.

Subgroup. A subgroup includes families that are similar in thickness of A_1 horizon, mottlings in B, and continuity of a textural B horizon. The characteristics

Table 28. — CLASSIFICATION OF WILL COUNTY SOIL SERIES BY GREAT SOIL GROUP

Great soil group	Soil series	
Gray-Brown Podzolic, including imperfectly oxidized (drained) associates	Alvin Blount Camden Eylar Fox Homer	Miami Morley Ritchey Starks Woodland
Regosol intergrade to Gray-Brown Podzolic or Gray-Brown Podzolic intergrade to Regosol	Chatsworth Hennepin	Plainfield Rodman[a]
Gray-Brown Podzolic intergrade to Brunizem, including imperfectly oxidized (drained) associates	Beecher Dresden Frankfort	Herbert Millbrook Oquawka
Brunizem, including imperfectly oxidized (drained) associates	Alexis Andres Brenton Channahon Elliott Hagener LaHogue Lisbon Lorenzo Martinton Mokena	Onarga Plattville Proctor Rankin Ridgeville Saybrook Symerton Troxel Warsaw Watseka
Planosol intergrade to Low Humic-Gley	Thorp	
Humic-Gley	Ashkum Bryce Drummer Harpster Joliet Maumee	Milford Millsdale Peotone Pittwood Rantoul Will
Bog Soils	Houghton	Lena
Alluvial	Du Page Huntsville	Millington
Alluvial intergrade to Lithosol	Romeo	

[a] Rodman may intergrade to Brown Forest.

used to define a subgroup represent some of the principal features that distinguish individual soil series, except that the parent materials within a subgroup may vary.

Group. Placement and development of a textural B horizon are the main criteria for this category. Other diagnostic horizons are considered in a few instances. Each group is relatively uniform in kind and arrangement of A and B horizons but may vary widely in kind of C horizon.

Suborder. Groups are assigned to suborders primarily on characteristics associated with degree of wetness in the solum and saturation of bases in the B horizon. Wet soils, whether artificially drained or not, are predominantly grayish in the A and B horizons except where organic carbon accumulation has obliterated all colors except black. Some yellowish or brownish mottles, along with brown to black iron-manganese concretions, are usually present. Well-oxidized soils, or those which are not wet, are primarily unmottled brown to yellowish-

Table 29. — TAXONOMIC KEY TO THE SOILS OF WILL COUN

Order	Suborder	Group	Subgroup	Family
Mineral soils with an A_1 or A_p (plowed layer) thicker than 5 inches if total solum is thicker than 10 inches; with chroma of 2 or less and value of 3 or darker (Munsell notations) when moist and uneroded; with base saturation of more than 50%; with calcium as the dominant metallic cation; and containing approximately 1.5 to 6.0% organic carbon (2.5-10.5% organic matter), except in the deep, dry sands.	Dark soils with thin or no A_2, no mottles evident, and base saturation of nearly 100%.	Soils without textural B.	Soils with A_1 greater than ½ of solum.	Heavy loamy soils, sola <10″ on limestone bedrock.
				Heavy loamy soils, sola <10″ on gravel.
	Dark soils with a grayish A_2 horizon and showing evidence of wetness, i.e. mottles throughout B.	Soils with textural B.	Soils with A_1 5 to 10″ thick and less than ½ of solum.	Heavy loamy A, fine-textured B soils, slowly permeable.
				Heavy loamy soils, sola thicker than 42″.
				Heavy loamy soils, sola 24–42″ thick.
	Dark soils with no A_2 horizon but saturated with water during part of each year unless drained. Hues range from 10YR to 5Y and chromas are 3 or less if accompanied by distinct mottles or 1 or less if not mottled. Base saturation in the B horizon is mostly between 90 and 100%.	Soils with weak[b] or no textural B and without calcium carbonate accumulation.	Soils with A_1 between 10 and 24″ thick.	Light loamy soils.
				Heavy loamy soils.
				Heavy loamy soils, sola 25–48″ on lst.[c] bedrock.
				Heavy loamy soils, sola 24–42″ on fragmental material.
				Heavy loamy soils, sola 10–25″ on lst.[c] bedrock.
				Fine-textured soils.
			Soils with A_1 greater than 24″ thick.	Heavy loamy soils.
				Fine-textured soils.

Table 29. — Continued

Order	Suborder	Group	Subgroup	Family
		Soils with textural B	A_1 between 10 and 24″ thick, gradual or clear boundary of A (unless A_p) with B.	Light loamy soils.
				Fine-textured soils.
		Soils without textural B but with calcium carbonate accumulation.	Calcium carbonate accumulation in A horizon.	Light loamy soils.
				Heavy loamy soils.
	Dark soils with no A_2 horizon, that show no evidence of wetness in the A horizon and little or no evidence in the upper B, i.e., lack distinct gray colors in upper 10″ of B, and with base saturation primarily between 50 and 90%.	Soils with weak or no textural B above 60″.	Soils with A_1 less than 10″ thick.	Sandy soils, B below 60″.
			Soils with A_1 more than 10″ thick.	Sandy soils, B below 60″.
				Heavy loamy soils.
			Mottles at less than 20″ depth.	Sandy soils
		Soils with textural B horizon above 60″.	Soils with no mottles in upper 10″ of B horizon.	Light loamy soils.
				Heavy loamy soils, sola thicker than 42″.
				Heavy loamy soils, sola 24–42″ thick.
				Heavy loamy soils, sola 10–25″ thick.

[a] The overall system of soil classification is being re-examined at the present time. The system presented here is designed to fi will permit. It should not be assumed that all of these soils as identified in other areas will exactly fit all categories defined here.

[b] A weak textural B is one in which a small amount of clay has accumulated. Some structure aggregates may have formed bu material.

[c] lst. = limestone.

Table 29. — Continued

Order	Suborder	Group	Subgroup	Family
			Soils with mottles in upper 10″ of B horizon.	Light loamy soils.
				Heavy loamy soils, sola thicker than 42″.
				Heavy loamy soils, sola 24 to 42″ thick.
Mineral soils with an A_1 less than 5 inches thick or an A_p (plowed layer) having value of 3.5 or lighter (Munsell notation) when moist, and less than about 0.75% organic carbon (1.3% organic matter). A_2 or A_3 has value of 4 or lighter when moist.	Light-colored soils that show little or no evidence of wetness in A and slight to no evidence of wetness in B. Textural B horizon has a base saturation of more than 35% throughout.	Soils with textural B with no tonguing of A_2 into B.	A_1 less than 5″ thick, free of mottles in upper 10″ of B and B is continuous horizontally.	Light loamy soils.
				Heavy loamy soils, sola thicker than 42″.
				Heavy loamy soils, sola 24–42″.
				Heavy loamy soils, sola 10–30″.
			A_1 less than 5″ thick, discontinuous B consists of lamellae, usually below 60″.	Sandy soils.
			A_1 less than 5″ thick, weak or no B.	Heavy loamy soils, sola less than 18″.

Table 29. — Concluded

Order	Suborder	Group	Subgroup	Family
			A_1 less than 5″ thick, mottles in upper 10″ of B.	Light loamy soils.
				Heavy loamy soils, sola thicker than 42″.
				Heavy loamy soils, sola 24–42″.
				Fine-textured soils, sola 18–42″.
				Fine-textured soils, sola less than 18″.
Organic soils with more than 20% organic matter.	Same as Order.	Muck on peat.	Muck more than 12″ thick.	Organic material thicker than 42″.

[a] The overall system of soil classification is being re-examined at the present time. The system presented here is designed to fit will permit. It should not be assumed that all of these soils as identified in other areas will exactly fit all categories defined here.

[b] A weak textural B is one in which a small amount of clay has accumulated. Some structure aggregates may have formed but material.

[c] lst. = limestone.

Table 30. — ESTIMATED AVERAGE ACRE YIELDS OF CROPS ON WILL COUNTY SOILS UNDER A HIGH LEVEL OF MANAGEMENT[a]

Type No.	Type name	Corn	Soy-beans	Oats	Alfalfa hay	Mixed pasture
		bu.	*bu.*	*bu.*	*tons*	*days*[b]
20	Woodland fine sandy loam	75	25	50	2.5	115
23	Blount silt loam	69	29	52	2.8	115
24	Miami silt loam	81	31	57	3.0	125
25	Hennepin loam	N	N	35	2.4	90
49	Watseka loamy fine sand	71	24	50	2.5	100
54	Plainfield sand	N	N	30	1.7	55
59	Lisbon silt loam	**100**	**38**	**70**	**3.5**	165
62	Herbert silt loam	88	35	63	3.1	140
67	Harpster silty clay loam	**82**	**34**	**55**	2.5	135
69	Milford silty clay loam to clay	**84**	**36**	**59**	**2.9**	145
73	Huntsville loam, bottom	**90**	**34**	**57**	3.2	150
80	Alexis silt loam	82	32	59	3.1	135
82	Millington loam, bottom	80	33	N	N	125
88	Hagener loamy sand	**65**	**21**	**43**	**2.3**	85
89	Maumee fine sandy loam	77	27	45	2.2	110
93	Rodman gravelly loam	N	N	30	2.0	70
102	LaHogue loam	**90**	**36**	**67**	**3.2**	140
103	Houghton muck	81	32	N	N	130
130	Pittwood fine sandy loam	85	34	56	2.8	130
131	Alvin fine sandy loam	70	23	47	2.6	100
132	Starks silt loam	79	30	54	2.8	125
134	Camden silt loam	80	30	56	3.0	125
145	Saybrook silt loam	**94**	**35**	**65**	**3.3**	155
146	Elliott silt loam	**80**	**31**	**61**	**3.1**	145
148	Proctor silt loam	**93**	**35**	**64**	**3.3**	150
149	Brenton silt loam	**100**	**38**	**70**	**3.5**	165
151	Ridgeville fine sandy loam	**83**	**32**	**61**	**3.1**	125
152	Drummer silty clay loam	**96**	**39**	**63**	**3.2**	155
157	Rankin sandy loam	74	27	53	2.9	110
189	Martinton silt loam	**87**	**35**	**66**	**3.2**	150
190	Onarga fine sandy loam	78	28	55	3.0	115
194	Morley silt loam	60	26	49	2.7	105
196	Harpster fine sandy loam	70	26	52	2.2	105
197	Troxel silt loam	96	36	68	3.3	160
206	Thorp silt loam	**72**	**31**	**52**	2.6	120
210	Lena muck	78	30	N	N	115
219	Millbrook silt loam	87	34	62	3.1	140
220	Plattville silt loam	86	33	63	3.1	145
228	Eylar silt loam	52	25	44	2.3	100
232	Ashkum silty clay loam	**82**	**33**	**57**	**2.8**	140
235	Bryce clay loam to loam	**74**	**31**	**52**	**2.6**	135
238	Rantoul silty clay	68	29	N	N	105
241	Chatsworth silty clay to clay	N	N	30	2.1	75
270	Oquawka sand	**59**	**18**	**37**	**2.0**	70
290	Warsaw silt loam	**86**	**34**	**66**	**3.1**	140
290–318	Warsaw silt loam-Lorenzo silt loam, undifferentiated	75	30	58	2.9	125
293	Andres silt loam	91	36	65	3.4	160
294	Symerton silt loam	86	34	62	3.2	150
295	Mokena silt loam	81	31	58	3.0	140
298	Beecher silt loam	75	30	56	2.9	130
311	Ritchey silt loam	50	24	46	2.5	100
313	Rodman loam	N	15	35	2.2	80
314	Joliet silt loam to silty clay loam	61	27	47	2.6	120
315	Channahon silt loam	56	26	50	2.7	110
316	Romeo silt loam	N	N	N	N	70

Table 30. — Concluded

Type No.	Type name	Corn	Soy-beans	Oats	Alfalfa hay	Mixed pasture
		bu.	*bu.*	*bu.*	*tons*	*days*[b]
317	Millsdale silty clay loam	85	35	59	3.0	145
318	Lorenzo silt loam	61	25	52	2.7	110
320	Frankfort silt loam to silty clay loam	66	27	49	2.7	115
321	DuPage silt loam, bottom	84	34	53	2.9	140
325	Dresden silt loam	80	31	60	3.0	130
326	Homer silt loam	80	31	56	2.8	120
327	Fox silt loam	74	29	54	2.9	120
329	Will silty clay loam	87	36	61	3.0	145
330	Peotone silty clay loam	81	32	45	2.0	115

[a] Yields are for uneroded or only slightly eroded conditions and for the most typical slope range under which each soil is found; yields from bottomlands assume no damage from flooding. *N* means crop not adapted. Yields in **bold face** are based on experiments by the Illinois Agricultural Experiment Station and long-time records kept by farmers in cooperation with the Department of Agricultural Economics; the others are estimated yields. A high level of management includes intensive and near optimum application (under present conditions) of the following management practices: adequate drainage, timely use of good cultural practices, careful handling of manure, the use of limestone, phosphate, and potash as soil tests indicate, and the use of a cropping system which retards erosion and helps to maintain good tilth and the nitrogen supply. Optimum levels of nitrogen are maintained by the use of additional nitrogen fertilizers where necessary.

[b] Estimated number of days that one acre will carry one cow.

Table 31. — AVERAGE ACRE YIELDS — JOLIET SOIL EXPERIMENT FIELD,[a] CHIEFLY ELLIOTT SILT LOAM (146) WITH SOME ASHKUM SILTY CLAY LOAM (232)

12-Year Average, 1949-1960, Series 100-600

Treatment[b]	1st-year corn	Soybeans	2nd-year corn	Oats	Wheat	Hay
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*tons*
O	34.9±1.7[c]	21.9±1.4[c]	30.4±2.7[c]	42.0±3.8[c]	17.3±1.6[c]	.8±.10[c]
M	51.9±2.1	26.0±1.2	55.3±3.5	55.2±4.7	26.3±2.2	1.3±.14
ML	61.8±2.2	27.0±1.2	65.0±3.8	60.6±3.6	29.0±2.0	1.6±.13
MLrP	72.7±2.7	29.3±1.2	72.9±3.2	65.9±3.8	35.9±2.3	2.4±.16
O	38.0±1.9	23.4±1.3	30.0±2.7	47.9±3.7	17.6±1.5	.9±.12
R	41.6±1.9	24.2±1.3	33.0±1.6	47.7±4.0	18.7±2.0	......
RL	50.5±2.3	25.2±1.4	44.4±1.7	49.6±3.9	20.3±1.9	......
RLrP	75.4±2.5	29.5±1.4	58.8±2.8	59.3±3.8	32.3±2.5	......
RLrPK	82.3±3.3	32.0±1.7	67.9±3.1	57.3±3.2	34.7±2.3	......
RLrP + 0-20-0	76.7±2.6	29.5±1.4	61.0±3.2	60.9±3.8	35.8±2.0	......
RLrPK + 0-20-0	82.0±3.0	31.8±1.6	67.6±3.3	59.4±3.7	35.7±2.1	......

[a] The cropping system followed was a 6-year rotation of corn, soybeans, corn, oats (legume catch crop), wheat, legume hay.

[b] O = no treatment; M = manure at the rate of 1 ton for each ton of crops removed; R = crop residues of stover, straw, legumes, including hay crop; L = limestone in 4 applications for a total of 9 tons per acre since 1915; rP = rock phosphate in 4 applications for a total of 4 tons per acre since 1915; K = muriate of potash (0-0-60) at 500 lb. an acre per rotation applied on the wheat, hay, and corn; 0-20-0 at 300 lb. per acre on the wheat since 1947 in addition to the normal treatment.

[c] Standard error of mean, $SEm = \frac{SEx}{\sqrt{n}}$, indicates the variability of sample means around the true mean, and hence the reliability of the observed mean. On the basis of 12 annual crop yields included in each mean, the true mean is expected to fall within ±2.2 SEm approximately 95 percent of the time. The standard error of the mean is also useful in judging the significance of differences between two means. If the difference is greater than 3 times the larger SEm of the means being compared, the difference is probably significant.

brown throughout the B. Intergrades between wet soils and soils that are not wet have some mottlings in the lower B or throughout the B, depending on the height to which the water table fluctuates. However, the A horizon is not mottled and has few or no iron-manganese concretions.

Order. All Will county soils can be grouped into three orders according to measurable differences in color, thickness, and other readily observed characteristics of A_1 or (A_p) horizons. These characteristics are determined by the amount of organic carbon (or organic matter) accumulated and preserved. This is due, in turn, to the type of native vegetation — which was predominantly either forest or prairie in Will county. Ponded conditions, as well as the probable existence of swamp vegetation, were partly responsible for the preservation of organic matter in muck soils. Base saturation in the A is an accessory characteristic.

SOIL USES

Present and future uses of the soils and soil materials in Will county are many and varied. After deposition the materials remained relatively undisturbed for several thousand years (page 84). During this time calcium carbonate was leached from most areas to a depth of 2 to 4 feet, organic matter accumulated in the surface or topsoil, and some clay accumulated in the subsoil. These and other changes produced soil layers or horizons, each with specific characteristics that tend to determine its best uses.

Agriculture

Some important management problems for each soil type are mentioned in the type descriptions, pages 13 to 78. Differences in slope and degree of erosion, while not shown on the map accompanying this report, need to be considered along with soil type in detailed farm planning. For these features and for more specific management suggestions consult the management guide (*13*) for individual farms or see the county farm adviser or Soil Conservation Service work unit conservationist.

Estimated long-time average yields of the major farm crops adapted to Will county are given in Table 30. These yields are for uneroded or only slightly eroded soils and for the most typical slope range on which each type is found. A high level of management is assumed, including (1) adequate drainage where needed; (2) a cropping system which retards erosion and helps maintain good soil tilth and an adequate nitrogen supply; (3) additional erosion-control practices where needed; (4) timely use of good cultural practices; (5) careful handling of manure and crop residues; (6) use of limestone, phosphate, and potash as soil tests indicate; and (7) application of supplemental nitrogen and minor elements as necessary.

The yields are based on current information. With more intensive practices or with improvements in soil and crop technology and farming practices, yields may be higher. Where practices are less intensive, where slope is unfavorable, or where erosion has been severe, lower yields may be expected.

Yields obtained on the Joliet experiment field are shown in Table 31.[1] Management on this field is considered high level, except where liming and fertilizer treatment is variable as shown in the table. According to the data in Table 31, additions of manure produce moderate to large increases over no treatment for all crops grown. Phosphorus produces moderate to large increases over both manure-lime and residue-lime for all crops grown except soybeans. Limestone

[1] Lang, A. L., Miller, L. B., and Mulvaney, D. L. Personal communication.

Table 32. — AVERAGE ACRE YIELDS, 1953 THROUGH 1960, OQUAWKA SOIL EXPERIMENT FIELD,[a] ON OQUAWKA SAND (270)

Series 200, 300, 500, and 600

Treatment[b]	Corn	Soybeans	Wheat[c]	Corn	Soybeans	Alfalfa hay	Alfalfa hay
	bu.	*bu.*	*bu.*	*bu.*	*bu.*	*tons*	*tons*
O	28.5 ± 3.1[d]	12.2 ± 2.5[d]	4.2 ± 1.2[d]	26.7 ± 3.8[d]	6.4 ± .9[d]	.4 ± .3[d]	.6 ± .5[d]
O+N	38.2 ± 8.7			56.3 ± 6.0			
M	42.8 ± 6.4	16.9 ± 3.4	8.9 ± 2.0	57.4 ± 9.5	10.6 ± 1.9	.8 ± .3	.7 ± .4
M+N	55.0 ± 8.1			84.3 ± 8.3			
ML	51.9 ± 12.8	20.2 ± 3.2	15.2 ± 2.4	72.8 ± 4.7	13.9 ± 1.2	1.6 ± .6	2.7 ± .7
ML+N	55.3 ± 16.5			82.0 ± 8.8			
MLrP	49.5 ± 13.7	20.9 ± 2.8	15.3 ± 2.1	71.8 ± 5.4	14.7 ± 2.4	1.7 ± .7	2.8 ± .9
MLrP+N	53.3 ± 22.2			82.0 ± 10.4			
RL	45.7 ± 9.8	19.2 ± 4.1	10.3 ± 2.4	54.0 ± 8.0	9.5 ± 1.5	.9 ± .3	1.3 ± .2
RL+N	43.0 ± 11.9			61.0 ± 6.6			
RLrP	41.9 ± 9.9	18.7 ± 3.8	11.1 ± 2.2	51.1 ± 6.8	9.6 ± 1.4	1.0 ± .4	1.6 ± .4
RLrP+N	51.2 ± 13.0			61.3 ± 8.0			
RLrPK	41.7 ± 14.6	22.1 ± 4.2	15.3 ± 2.7	64.8 ± 8.3	13.2 ± 1.1	1.9 ± .6	3.0 ± .8
RLrPK+N	47.5 ± 15.5			79.7 ± 10.1			
New treatments beginning in 1951							
RLK	44.6 ± 9.8	20.5 ± 3.0	11.8 ± 2.1	48.5 ± 5.5	10.0 ± 2.5	1.0 ± .6	2.0 ± .8
RLK+N	43.1 ± 2.3			76.1 ± 2.5			
RLsPK	41.3 ± 4.1	20.8 ± 3.7	11.7 ± 1.7	47.6 ± 4.2	10.5 ± 2.0	1.2 ± .7	2.1 ± .9
RLsPK+N	58.8 ± 10.7			80.1 ± 5.7			
RLrPK	41.6 ± 4.5	19.8 ± 3.2	12.2 ± 2.3	41.5 ± 1.7	9.4 ± .9	.9 ± .6	2.0 ± .9
RLrPK+N	45.4 ± 11.8			66.3 ± 7.0			

[a] The cropping system followed from 1951 through 1960 was corn, soybeans, wheat (clover catch crop), corn, soybeans, wheat, alfalfa, and alfalfa.

[b] O = no treatment; M = manure at the rate of one ton for each ton of crops removed; R = crop residues of stover, straw and legumes; L = limestone — 7 applications for a total of 13 tons per acre since 1915; rP = rock phosphate — 4 applications for a total of 4 tons per acre since 1915; sP = superphosphate (0-20-0) — 400 lb. per acre per rotation since 1951 (200 lb. on wheat, 100 lb. on corn, and 100 lb. on hay); K = muriate of potash (0-0-60) — 332 lb. per acre per rotation (83 lb. on each crop); N = nitrogen — 60 lb. per acre side-dressed on corn.

[c] Each average yield for wheat includes 8 annual yields, 4 produced during the first part of the rotation sequence, and 4 produced during the last part (see footnote a). Wheat yields were similar during both the first and last parts of the cropping sequence and, therefore, they were combined into an 8-year average, 1953-1960. Each average yield for corn, soybeans, and alfalfa hay includes 4 annual yields. Average yields of these 3 crops were different, depending upon their position in the cropping system.

[d] Standard error of mean, $SEm = \frac{SEx}{\sqrt{N}}$, indicates the variability of sample means around the true mean, and hence the reliability of the observed mean. On the basis of 8 annual crop yields included in each mean for wheat, the true mean is expected to fall within ± 2.3 SEm approximately 95 percent of the time. On the basis of 4 annual crop yields included in each mean for corn, soybeans, and alfalfa hay, the true mean is expected to fall within ± 3.2 SEm approximately 95 percent of the time.

in combination with manure or residues increases the yields of corn but has only a slight effect on other crops. Potassium tends to increase yields of corn, soybeans, and wheat over the residues-lime-phosphorus treatment. In the residue system, first-year corn outyielded second-year corn by 6 to 16 bushels an acre. The lower yields of second-year corn are probably due to inadequate nitrogen.

Table 32[1] shows yields of corn, soybeans, wheat, and alfalfa hay on the Oquawka Soil Experiment Field in Henderson county. This field is on Oquawka sand, some of which occurs in Will county. Information from this field should also apply to Plainfield sand, Hagener loamy sand, and other relatively drouthy sandy soils.

On this field, manure increased the yields of corn, soybeans, and wheat. Limestone in addition to manure further increased the yields of these crops, and also increased yields of alfalfa hay. Limestone with crop residues had about the same effect as manure alone. Rock phosphate in addition to manure-lime

[1] Lang, A. L., Miller, L. B., and Gholson, C. A. Personal communication.

Table 33. — SOME ENGINEERING PROPERTIES AND DATA OF SELECTED HORIZONS OF THE PRE

Area on assoc. map	Soil series[b]	Organic matter in 0-7″ layer[c]	Seasonal water table[d]	Horizon	Depth in inches	B.P.R. report number	Structure	Permeability	Shrink-swell potential	Grain sizes[e]: Percent passing sieve No. 10 2.0 mm.	No. 40 0.42 mm.	No. 200 0.074 mm.	% silt .05-.002 mm.	% clay <.002 mm.	M n de lb
I	Miami near modal	Low	Low	A_1	0-6	87953	Crumb	Moderate	Moderate	**100**	**98**	**92**	**64**	**25**	
				B_2	16-32	87954	Subangular blocky	Moderate	Moderate	**99**	**98**	**94**	**45**	**45**	
II	Drummer heavy B phase	Very high	High	A_1	0-20	87947	Granular	Moderate	Very high	**100**	**98**	**94**	**56**	**36**	
				B_g	20-32	87948	Angular blocky	Moderate	Very high	**100**	**98**	**93**	**50**	**40**	
				B-C	32+	87949	Massive	Moderate	Moderate to low	**100**	**98**	**93**	**50**	**41**	
	Lisbon	High	Medium	B			Subangular blocky	Moderate	High	98-100		80-95		35-45	9
				C			Massive	Moderate	Low	85-95		60-90		15-30	11
	Saybrook near modal	High	Low	A_1	0-12	87950	Granular	Rapid	High	**100**	**99**	**92**	**62**	**27**	
				B_2	21-32	87951	Subangular blocky	Moderate	Moderate	**100**	**99**	**94**	**48**	**44**	
				C	32+	87952	Massive	Moderate	Low	**84**	**80**	**74**	**44**	**27**	
III	Blount borderline to Morley	Low	Medium	A_p	0-10	87955	Crumb	Slow	Moderate	**98**	**96**	**87**	**67**	**17**	
				B_2	15-27	87956	Angular blocky	Slow	High	**96**	**95**	**90**	**40**	**48**	
				C	27+	87957	Massive	Slow	Moderate	**97**	**94**	**88**	**53**	**32**	
	Eylar near modal	Low	Medium	A_p	0-6	87960	Crumb	Moderate	Moderate	**99**	**97**	**88**	**57**	**28**	
				B_2	11-22	87961	Angular blocky	Very slow	High	**99**	**98**	**95**	**34**	**61**	
				C	22+	87962	Angular blocky to massive	Very slow	High	**100**	**98**	**94**	**40**	**54**	
IV-V	Ashkum near modal	Very high	High	A_1	0-12	87965	Granular	Moderate	Very high		**100**	**98**	**56**	**39**	
				B_2	12-26	87966	Angular blocky	Slow	Very high			**100**	**51**	**47**	
	Beecher	Medium	Medium	B			Angular blocky	Slow	High	95-100		80-95		30-50	10
				C			Massive	Slow	Moderate	95-100		75-90		25-45	10
	Elliott moderately well drained	High	Medium	A_1	0-8	87963	Granular	Moderate	High		**100**	**95**	**62**	**29**	
				B_2	18-33	87964	Angular blocky	Slow	High	**100**	**99**	**87**	**45**	**40**	
VI	Andres	High	Medium	B			Subangular blocky	Moderate	High	98-100		85-95		35-45	9
				C			Massive	Slow	Moderate	95-100		75-90		25-40	10
	Symerton	High	Low	B			Subangular blocky	Moderate	Moderate	98-100		85-95		30-45	9
				C			Massive	Slow	Moderate	95-100		75-90		25-40	10

Table 33. — Continued

Area on assoc. map	Soil series[b]	Organic matter in 0-7″ layer[c]	Seasonal water table[d]	Horizon	Depth in inches	B.P.R. report number	Structure	Permeability	Shrink-swell potential	Grain sizes[e]: Percent passing sieve No. 10 2.0 mm.	No. 40 0.42 mm.	No. 200 0.074 mm.	% silt .05-.002 mm.	% clay <.002 mm.	M n . de lb
VII	Bryce near modal	Very high	High	A_1	0–12	87958	Granular	Moderate	Very high		**100**	**99**	**59**	**38**	
				B_g	12–36	87959	Angular blocky	Very slow	High	**100**	**98**	**93**	**41**	**52**	
	Frankfort	Medium	High	B			Angular blocky	Very slow	High	98–100		80–98		40–55	9
				C			Massive	Very slow	High	98–100		80–98		35–55	10
VIII	Brenton	High	Medium	B			Subangular blocky	Moderate	High	98–100		70–95		20–45	10
				C			Stratified	Moderate	Low	75–100		35–95		10–40	10
	Drummer	Very high	High	B			Angular blocky	Moderate	Very high	95–100		60–95		20–45	9
				C			Stratified	Moderate	Low	75–100		35–95		10–40	10
IX	Rodman	High to low	Very low	A_1			Crumb	Moderate	Moderate	98–100		75–95		20–45	9
				C			Single grain	Very rapid	Very low	25–50		0–20		0–5	11
	Warsaw near modal	High	Very low	A_1	0–14	87944	Crumb	Moderate	Moderate	**100**	**99**	**95**	**69**	**25**	
				B_2	24–30	87945	Subangular blocky	Moderate	Moderate	**100**	**97**	**91**	**51**	**43**	
				C	33+	87946	Single grain	Very rapid	Very low	**28**	**15**	**4**	**3**	**1**	
X	Alvin	Very low	Very low	B			Subangular blocky	Moderate	Low	98–100		25–45		5–25	11
				C			Single grain	Very rapid	Very low	95–100		15–75		5–15	11

[a] Data in **bold face** are results of analyses made in laboratories of the U. S. Bureau of Public Roads using standard procedures of the Ame
others are estimated ranges.

[b] The soil series listed in this table comprise 82 percent of the area of Will County.

[c] Relative average amounts of organic matter in the surface 7″ layer (approximate plow depth) of uneroded soils are: very low = less t
cent, high = 5 to 8 percent, and very high = more than 8 percent.

[d] Water table is usually highest in spring and may be permanent or perched. In areas of fine-textured till it is usually perched. Re
above surface, high = at surface, medium = within 1 to 2 feet, low = within 2 to 4 feet, very low = seldom within 5 feet.

[e] The various grain-size fractions were calculated on the basis of total material. Determinations of silt and clay were by the hyd
analyses data.

[f] Classification estimates shown in **bold face** indicate probable predominant classification.

[g] Average value for percentage coarser than 2 millimeters was used in this classification.

[h] N.P. = nonplastic.

[i] lst = limestone.

Table 33. — Concluded

Area on assoc. map	Soil series[b]	Organic matter in 0-7″ layer[c]	Seasonal water table[d]	Horizon	Depth in inches	B.P.R. report number	Structure	Permeability	Shrink-swell potential	Grain sizes[e]: Percent passing sieve No. 10 2.0 mm.	No. 40 0.42 mm.	No. 200 0.074 mm.	% silt .05-.002 mm.	% clay <.002 mm.
XI	Maumee near modal	High	High	A_1	0–18	87970	Single grain	Very rapid	Moderate to low	**100**	**98**	**22**	**12**	**8**
				B–C	18+	87971	Single grain	Very rapid	Very low	**100**	**99**	**9**	**2**	**5**
	Watseka	Medium	Medium	A_3			Single grain	Very rapid	Low	98–100		20–30		4–10
				C			Single grain	Very rapid	Very low	98–100		3–25		0–10
XII	Plainfield	Very low	Very low	A_3			Single grain	Very rapid	Very low	98–100		8–30		3–10
				C			Single grain	Very rapid	Very low	98–100		3–25		0–10
XIII	Joliet	High	High	B			Subangular blocky	Moderate	High	98–100		50–90		20–40
				R			Level — bedded lst.[j]							
	Romeo	Medium	Very high to very low	A_1			Crumb	Moderate	Low	90–100		40–90		20–30
				R			Level — bedded lst.							
XIV	Huntsville	High	Medium	A_1			Stratified	Moderate	Moderate	98–100		85–98		15–40
				C			Stratified	Moderate	Low	85–100		20–50		10–25
	Proctor coarse-textured at 4–5 ft.	High	Low	A_1	0–16	87967	Crumb	Moderate	Moderate	**100**	**93**	**66**	**42**	**20**
				B_2	28–45	87968	Subangular blocky	Moderate	Moderate	**91**	**77**	**39**	**17**	**20**
				C	45+	87969	Single grain	Very rapid	Very low	**43**	**30**	**16**	**8**	**6**

[a] Data in **bold face** are results of analyses made in laboratories of the U. S. Bureau of Public Roads using standard procedures of the Ame
others are estimated ranges.

[b] The soil series listed in this table comprise 82 percent of the area of Will County.

[c] Relative average amounts of organic matter in the surface 7″ layer (approximate plow depth) of uneroded soils are: very low = less t
cent, high = 5 to 8 percent, and very high = more than 8 percent.

[d] Water table is usually highest in spring and may be permanent or perched. In areas of fine-textured till it is usually perched. Re
above surface, high = at surface, medium = within 1 to 2 feet, low = within 2 to 4 feet, very low = seldom within 5 feet.

[e] The various grain-size fractions were calculated on the basis of total material. Determinations of silt and clay were by the hyd
analyses data.

[f] Classification estimates shown in **bold face** indicate probable predominant classification.

[g] Average value for percentage coarser than 2 millimeters was used in this classification.

[h] N.P. = nonplastic.

[j] lst = limestone.

and residues-lime treatments gave little or no increases on this field. However, the sandy soils of Will county are somewhat lower in available phosphorus than those of Henderson county, and so may be more responsive to rock phosphate or superphosphate. Potash on the Oquawka field tended to increase yields of alfalfa hay, corn, and soybeans in the second half of the rotation but not the first half. Supplemental nitrogen on corn gave variable but relatively good increases on all plots except residues-lime and residues-lime-potash.

According to information from the Indiana Sand Experiment Field, near Culver, limestone along with manure gives good yield increases on such sandy soils as Plainfield, Oquawka, and Hagener. Without manure, a complete fertilizer is important. If no legume hay crops are grown so that no top growth is returned, supplemental nitrogen is also needed (*15*). Irrigation experiments, 1955 through 1958, indicate that with adequate fertilization and proper plant population, irrigation should double or triple corn yields (*16, 17*).

Engineering[1]

This soil report and the soil map are prepared chiefly for agronomic purposes and may be somewhat generalized for certain engineering uses. However, they should be useful in planning more detailed engineering surveys in the immediate area of any construction project in Will county. Table 33 gives some common engineering properties of 25 soil series. All these series except Eylar appear in the legend of the soil association map (Fig. 19). Together, the 25 series make up 82 percent of the area of Will county. Interpretations for the other soil types may be made from the information given for similar soils.

Some important soil properties in the application of engineering practices are organic matter content, texture (grain size or particle-size distribution), kind of clay (*14, 27*), and compactness. Because Will county soils range widely in these properties, the profile characteristics of each type as described on pages 13 to 78 should be studied thoroughly before construction projects are undertaken. Although the use of large earth-moving machinery usually precludes separating the material of one soil horizon from that of another, such separations are desirable and important for certain purposes (*21*).

[1] This section was prepared in cooperation with T. H. Thornburn, Professor of Civil Engineering.

Organic matter will absorb large amounts of water and will swell and shrink a great deal. Material high in organic matter should not be used as road fill or subgrade material or as footings for buildings. It should be avoided as much as possible in the construction of earthen dams, levees, terraces, and similar structures. Instead it should be used as top dressing for lawns and on cuts and fills where grasses, shrubs, trees, or possibly crops are to be grown. Areas of soils high in organic matter are excellent places in which to install absorption fields for home sewage-disposal systems providing other factors are favorable, such as slope, depth of organic horizon, permeability of substrata, and depth to water table.

When undisturbed, the A_1 horizon (surface soil or topsoil) of all Will county soils is relatively high in organic matter. After cultivation, the percentage of organic matter in the plowed layer (A_p) becomes considerably lower in many soils.

This is particularly true of the light-colored Gray-Brown Podzolic soils developed under forest vegetation, where the plowed layer is thicker than the A_1 horizon. Normally the plowed layer of these soils is a mixture of the original A_1 and A_2 horizons, but on severely eroded slopes it consists of B or C horizon material. Where the virgin A_1 horizon of

these soils ranges between 4 and 8 percent organic matter (organic carbon × 1.724), the A_p usually has less than 3 or 3.5 percent. Before buildings or highways are constructed in or across areas of Gray-Brown Podzolic soils, the organic A_1 and silty or sandy A_2 horizons should be removed and replaced with gravel or crushed rock to obtain a more stable foundation or subgrade.

In the dark Brunizem and very dark Humic-Gley soils, whose original A_1 horizons were thicker than the present plowed layer, organic matter may be reduced only slightly by farming. It will be low, however, on severely eroded slopes where the A_p is composed of B or C horizon material.

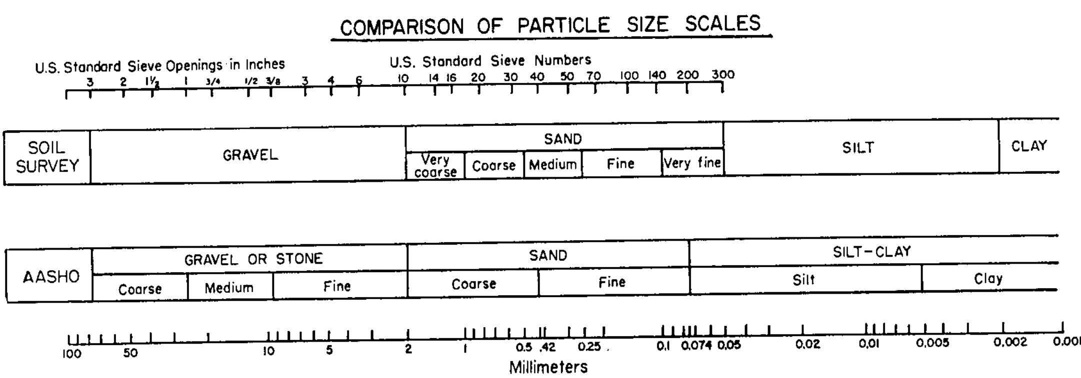
The Brunizem A_1 horizons generally range between 4 and 9 percent in organic matter, and the Humic-Gleys between 5 and 10 percent. Before construction work, the A_1 horizons should be removed and replaced with more stable materials. The A_1 materials of the Brunizem soils, such as Andres, Brenton, Elliott, La-Hogue, Lisbon, Proctor, Saybrook, and Symerton, are excellent as top dressing for lawns and gardens.

Muck soils usually are 25 to 65 percent organic matter, whereas peat soils are usually more than 65 percent. In Houghton muck and Lena muck areas all structures should be pile-supported or else the organic and other unstable materials should be removed and replaced with gravel, rock, or other stable materials.

Areas of both Humic-Gley and muck soils need considerable filling to raise all exposed parts of structures above high water. Underground structures will need to be waterproofed as adequate drainage is difficult to establish. Sewage-disposal absorption fields should not be placed in undrained areas of Humic-Gley or muck soils because the water table is often at or above the soil surface, particularly during wet seasons.

Texture. A very important soil characteristic for engineering purposes is texture or the distribution of the various-sized particles (gravel, sand, silt, and clay). Tables 6 through 24 give this information for some of the soil types. These tables indicate the textural classification used by the U. S. Department of Agriculture and the Illinois Agricultural Experiment Station, which differs slightly from the one used by the American Association of Highway Officials (Fig. 20).

Gravel is composed of rock fragments too coarse to flow when saturated with water. It is easy to move with power-driven machinery. Gravel is excellent for road and railroad fill, subgrade material, and footings for structures. When washed and screened it is useful in concrete construction. It is poor material



Relationships between the four major particle-size fractions as used by the Soil Survey and as used by the American Association of State Highway Officials. Principal differences are the points at which silt is separated from sand and clay is separated from silt. (Fig. 20)

for diversion terraces, levees, and dams. Most gravel deposits in Will county contain variable proportions of finer material.

The C horizons of Dresden, Fox, Homer, Lorenzo, Rodman, Warsaw, and Will soils have enough gravel to be coarse, loose, and porous. Farm ponds and reservoirs should not be located in areas of these soils with the expectation of maintaining a water level above the permanent ground-water table. Rodman, Warsaw, Lorenzo, and Fox soils are excellent for sewage-disposal absorption fields, but the fields should not be placed near shallow wells that supply water for homes. Dresden and Homer are fairly suitable if the tile lines are placed no deeper than about 2 feet. Will silty clay loam is not suitable because the ground-water level approaches the land surface during wet periods.

Sand is composed of rock and mineral grains smaller than 2.0 millimeters in diameter but coarse enough to be seen with the naked eye or with a low-power (5- to 10-power) lens. It is the chief grain size to a depth of about 3 feet in Rankin, and to depths of 4 or more feet in Alvin, Hagener, Harpster fine sandy loam (No. 196), Maumee, Onarga, Oquawka, Pittwood, Plainfield, Ridgeville, Watseka, and Woodland.

Oquawka and Plainfield represent the cleanest sand to be found in Will county. They contain very little organic matter, silt, or clay. The A_1 horizons of Maumee and Harpster fine sandy loam are relatively high in organic matter. Alvin and Woodland are low in organic matter but have some clay in the B horizons. Onarga, Rankin, and Ridgeville have moderate accumulations of organic matter in the A horizons and moderate amounts of clay in the B. Rankin also has a silty clay loam till substratum at a depth of 2 to 3 feet. Pittwood is high in organic matter in the A and has a moderate clay accumulation in the B horizon.

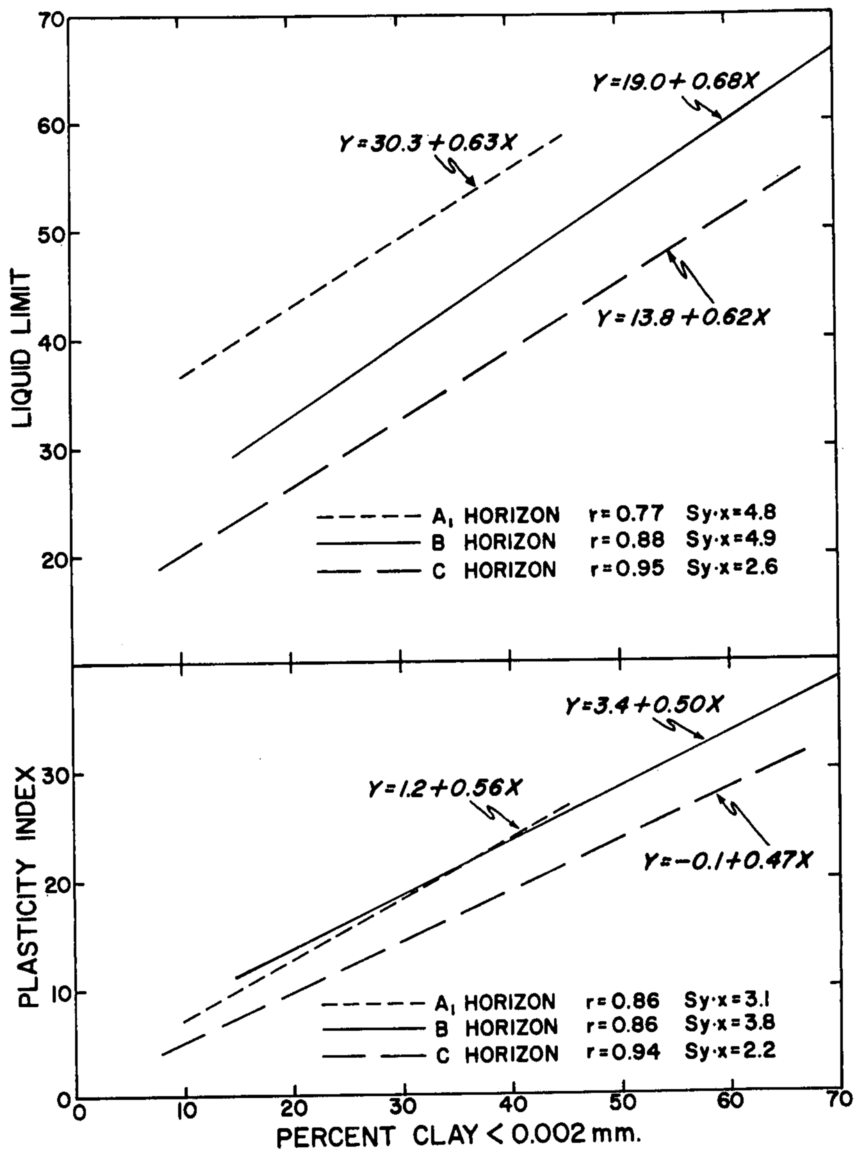
Sand is nonplastic and has a very low liquid limit. It is easy to move but has only fair to poor compaction characteristics. When saturated with water it flows readily and is very unstable. It is relatively stable when dry. It is not suitable for terraces, levees, or dams and is not good fill material unless kept dry. All well-drained sandy soils are excellent for sewage-disposal absorption fields. Maumee, Harpster (No. 196), Woodland, and Pittwood are not suitable unless thoroughly drained.

Silt particles cannot be distinguished with the naked eye but can be seen with a high-power lens or microscope. Silt is an important constituent of various horizons in a large number of soil types. It is mixed with sand or gravel in some horizons of a few soils and with clay in all horizons of many soils in Will county.

All A horizons of the loam and silt loam soil types are high in silt. B horizons vary from relatively low to relatively high silt contents. The C horizons of Brenton, Hennepin, Herbert, Lisbon, Miami, Millbrook, Saybrook, and Starks soils are composed of material high in silt. However, the till C horizons are usually somewhat compacted from glacial action and are often slowly permeable.

On the upland moraines and till plains the silty covering is probably derived primarily from a thin loessial overburden; on the outwash plains and bottomlands silt is mostly water-deposited. Loam, silt loam, and silty clay loam glacial tills are also high in silt.

Silt loam material has high absorptive capacity. When saturated with water, it flows readily and is unstable. When dry, it is stable. It is easy to move but has only fair compaction characteristics. Although it is fair for low dikes, levees, or diversion terraces, it erodes easily. Silt makes a good top dressing for lawns, particularly when organic matter is high as in the dark brown to black A_1 soil horizons. It is suitable for sewage-disposal absorption fields if other factors such as depth to water table, slope, and thickness, are favorable.



Liquid limit and plasticity index increase with an increase in clay content. Liquid limit also increases with organic matter. Kind of clay is sometimes important. Clay-content data used in this chart were determined by the pipette method. (Fig. 21)

Clay particles are extremely fine — less than 0.002 mm. (1/12,500 inch). Clay is present in all horizons of all Will county soils, but in widely varying amounts. In the C horizons of Fox, Lorenzo, Rodman, Warsaw, Plainfield, Hagener, Oquawka, and Watseka, clay content is usually less than 3 percent and may be as low as 1 percent. In parts of the B horizons of Eylar, Chatsworth, and Frankfort, it may be as high as 60 percent. All horizons of the other soils range between these two extremes.

There is fair but not exact correlation between clay content, liquid limit, and plasticity index (Table 33). The amount of organic matter, kind of clay, orientation of particles, and proportions of

gravel, sand, and silt are also important. In general, liquid limit increases with increase in clay (Fig. 21). But for a given amount of clay, the liquid limits are highly significantly greater in the A_1 horizons than in B and C horizons. The primary reason is that the A_1 horizons contain more organic matter (Tables 6 through 24). A highly significant difference in liquid limit also exists between the B and C horizons. The liquid limit is higher in the B horizon because montmorillonite makes up a large proportion of the B horizon clay minerals.

Plasticity index also increases with clay content and, for a given amount of clay, the A and B horizons have higher plasticity indexes than C horizons (Fig. 21).

Not only do soil materials high in clay have different engineering uses than those low in clay, but the uses of clay soils vary with the degree of wetness or dryness. Soil material that is more than about 27 percent clay is hard when dry. Combined with silt, it is soft and oozelike when saturated with water. At optimum moisture, clay is pliable, but it is also sticky and is likely to adhere to earth-moving machinery. All these characteristics pose engineering problems.

The extent of the engineering problems also varies with the kind of clay minerals. In general montmorillonite is the most active clay mineral in Will county soils and presents the most problems. A discussion of the different kinds of clay is on page 84.

Compactness. Specific information on soil compaction is meager. Bulk density measurements[1] or maximum dry density measurements (Table 33) reflect compaction, but they are also influenced by texture, structure, and organic matter content.

Other things being equal, compact material has a higher density than material that is not compact. In general, unleached till is more compact than unleached loess. The bulk density of unleached till in northeastern Illinois varies from 1.56 to 1.80, with an average of 1.70 for eight determinations. The bulk density of unleached loess from central and northwestern Illinois varies from 1.31 to 1.58 with an average of 1.47 for eleven determinations. Till is more dense because it has been compacted by glacial ice.

Water moves very slowly through compact till. Such material is not suitable for sewage-disposal absorption fields. Farm drainage systems do not function properly where the tile are placed in compact till.

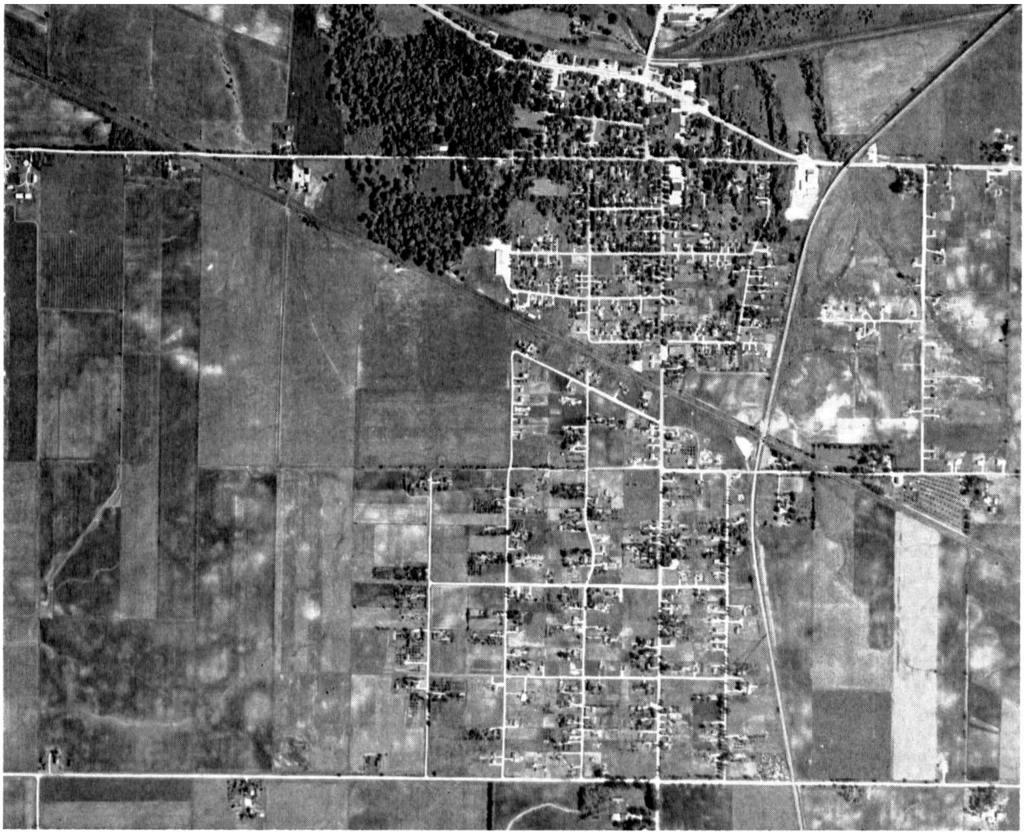
If left undisturbed, compact till of loam and finer texture is usually very stable and is excellent as footings for structures, subgrade, and as basins for lakes or ponds. After it is dug up it more nearly assumes the properties of its predominating texture or grain size.

Urban Development

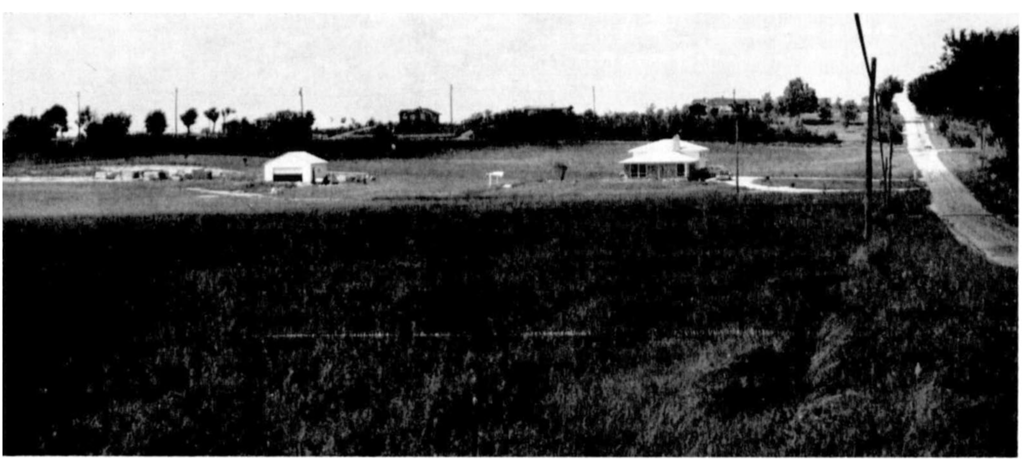
The last 10 years or so have seen an increase in size and number of housing developments in Will county, and the trend is likely to continue (Figs. 10 and 22). Such expansion has created problems in proper land use. Because the characteristics and proper use of soils vary widely, caution is needed in choosing locations, not only for dwellings but for many types of industrial developments.

Many soil characteristics mentioned in the detailed profile descriptions (pages 13 to 78), as well as some of the features discussed in the foregoing agricultural and engineering interpretation sections, apply to the use of soils and soil mateials for urban development. These sec-

[1] Bulk density values are determined from the weight of a given volume of oven-dry (105° C.) soil material divided by the weight of an equal volume of water.



Many farms are giving way to subdivisions, shopping centers, and industry. Good land-use planning is needed to preserve the more productive land for agriculture. (Fig. 22)



Caution must be used in choosing sites for dwellings and other buildings. Low areas should be avoided unless adequate drainage can be maintained. (Fig. 23)

tions, together with the soil map at the back of this report, will indicate the soil characteristics in any given area.

Locations should be chosen with as much suitable soil material as possible and then the best use should be made of each material. This is necessary to obtain stable footings, adequate drainage around the base of foundations, satisfactory absorption fields for home sewage systems (*3A*), a smooth surface for attractive landscaping, and a topsoil for lawn and garden that is fertile and porous without being loose and drouthy.

Not all housing or industrial developments can be built in areas of desirable soil materials. But indiscriminate location of these developments in Will county without a thorough understanding of soil conditions can mean undesirable consequences in the form of health hazards and added expense (Fig. 23).

If a chosen area does not provide soil materials suitable for every purpose, then proper building materials, construction methods, and drainage systems become especially important. Often prior examination by trained personnel and careful planning by the subdivider and contractor will be needed for best results.

LITERATURE CITED

1. BARGER, G. L., SHAW, R. H., and DALE, R.F. Chances of receiving selected amounts of precipitation in the North Central Region of the United States. Iowa Agr. Exp. Sta. mimeo. 1959.
2. BARTELLI, L. J., and ODELL, R. T. Field and laboratory studies of a clay-enriched horizon in the lowest part of the solum of some Brunizem and Gray-Brown Podzolic soils in Illinois. Soil Sci. Soc. Amer. Proc. **24**, 388-395. 1960.
3. BEAVERS, A. H., JOHNS, W. D., GRIM, R. E., and ODELL, R. T. Clay minerals in some Illinois soils developed from loess and till under grass vegetation. Third Nat. Conf. Clays and Clay Min. Proc. Nat. Acad. Sci., Nat. Res. Council Pub. 395, 356-372. 1955.

3A. BENDER, W. H. Soils suitable for septic-tank filter fields. U. S. Dept. Agr., Soil Cons. Serv., Agr. Inf. Bul. 243. 1961.

4. COLEMAN, A. P. Ice ages recent and ancient. Macmillan Co., New York. 1929.
5. EKBLAW, G. E., and ATHEY, L. F. Glacial Kankakee torrent in northeastern Illinois. Bul. Geol. Soc. Amer. **36**, 279-342. 1925.
6. EKBLAW, G. E. Map of Wisconsin moraines in northeastern Illinois. Ill. State Geol. Surv. Revised 1960.
7. FISHER, D. J. Geology and mineral resources of the Joliet quadrangle. Ill. State Geol. Surv. Bul. 51. 1925.
8. HUFF, F. A., and CHANGNON, S. A., JR. Hail climatology of Illinois. Ill. State Water Surv. Rpt. of Invest. 38. 1959.
9. HUFF, F. A., and NEILL, J. C. Frequency relations for storm rainfall in Illinois. Ill. State Water Surv. Bul. 46. 1959.
10. JOOS, L. A. Freeze probabilities in Illinois. Ill. Agr. Exp. Sta. in cooperation with U. S. Weather Bureau, Bul. 650. 1960.
11. LEIGHTON, M. M. The naming of the subdivisions of the Wisconsin glacial age. Science **77**, 168. 1933.
12. LEIGHTON, M. M. Important elements in the classification of the Wisconsin glacial stage. Jour. Geol. **66**, 288-309. 1958.
13. ODELL, R. T., VEALE, P. T., and KLINGEBIEL, A. A. How to know your soils and manage them wisely—a personal guide for every farmer in Will county, Illinois. Ill. Agr. Exp. Sta. and Ext. Serv. in cooperation with U. S. Dept. Agr. 1954.
14. ODELL, R. T., THORNBURN, T. H., and MCKENZIE, L. J. Relationships of Atterberg limits to some other properties of Illinois soils. Soil Sci. Soc. Amer. Proc. **24**, 297-300. 1960.
15. PURDUE UNIVERSITY AGRICULTURAL EXTENSION SERVICE. Summary of some of the results on the Sand Experiment Field. Mimeo AY-74B. Revised 1960.

16. PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION. Results of irrigating corn on sandy soils in Indiana. Mimeo AY-128. 1956.

17. PURDUE UNIVERSITY AGRICULTURAL EXPERIMENT STATION. Performance of hybrid corn varieties with irrigation, Purdue Sand Experimental Field. Mimeo AY-136. Revised 1959.

18. RUHE, R. V., RUBIN, M., and SCHOLTES, W. H. Late Pleistocene radiocarbon chronology in Iowa. Amer. Jour. Sci. **255**, 671-689. 1957.

19. RUST, R. H. Relationship between corn yield and depth of surface soil on Elliott silt loam in 1949 and 1950. Dept. Agron., Ill. Agr. Exp. Sta. Mimeo AG-1472. 1950.

20. SUESS, H. E. Absolute chronology of the last glaciation. Science **123**, 355-357. 1956.

21. THORNBURN, T. H. Surface deposits of Illinois. Univ. of Ill. Civ. Eng. Studies, Soil Mech., Ser. 4. 1960.

22. THORP, JAMES, CADY, J. G., and GAMBLE, E. E. Genesis of Miami silt loam. Soil Sci. Soc. Amer. Proc. **23**, 156-161. 1959.

23. UNITED STATES CENSUS.

24. UNITED STATES DEPARTMENT OF AGRICULTURE. Soils and men, yearbook of agriculture, 979-992. 1938.

25. UNITED STATES WEATHER BUREAU in cooperation with Ill. State Water Surv. Climatic summary of the United States, Illinois. 1955.

26. WASCHER, H. L., ALEXANDER, J. D., RAY, B. W., BEAVERS, A. H., and ODELL, R. T. Characteristics of soils associated with glacial tills in northeastern Illinois. Ill. Agr. Exp. Sta. Bul. 665. 1960.

27. WHITE, W. A. Atterberg plastic limits of clay minerals. Amer. Min. **34**, 508-512. 1949.

GLOSSARY

Alluvial sediment — soil material deposited from flowing water when speed of water is reduced.

Alluvial soil — soil material so recently deposited that no recognizable B horizon has formed although some organic matter may have accumulated in the A.

Bog soil — a soil with a surface horizon dominated by organic matter.

Brunizem soil — a soil with a thick (>10–12 inches) dark A_1, no A_2, and sometimes an A_3, on a well-oxidized B horizon. Some soils with an imperfectly oxidized B have been classified as Brunizem in this report.

Calcareous — containing enough limestone particles to cause the soil mass to effervesce (bubble) when treated with dilute hydrochloric (muriatic) acid.

Catena (soil) — a group of associated soils which developed from similar parent material but which differ in characteristics of the solum because of differences in oxidation or drainage.

Compact — closely packed and difficult to penetrate.

Consistence — resistance to crushing or rupture, due to the attraction of particles to one another.

Drift (glacial) — materials of glacial origin, including both till and outwash.

Gray-Brown Podzolic soil — a soil with a thin (<4–5 inches) dark A_1 and a light brownish-gray A_2 on a well-oxidized B horizon. Some soils with an imperfectly oxidized (mottled) B have been classified as Gray-Brown Podzolic in this report.

Horizon (soil) — a natural layer or structural division lying approximately parallel to the land surface and differing from adjacent layers in one or more characteristics. The principal horizons are designated by the letters A, B, C, and R (Fig.2) . Subhorizons are designated by subscript numerals — 1, 2, 3, etc. — after the letters, except that a plowed layer is designated by the symbol A_p. Roman numerals designate lithologic discontinuities, or marked changes in the character of the rock. The numeral I is omitted, and only II, III, etc., are used to indicate the second, third, or more contrasting layers.

Humic-Gley soil — a soil with a thick (>10–12 inches) black A_1 that grades gradually into a grayish B that usually has a few yellowish-brown to olive mottles.

Krotovina — a crayfish or other crustacean burrow, sometimes also a rodent burrow, partly or wholly filled with darker soil material. Best developed in the B horizon of Humic-Gley soils.

Lacustrine sediment — soil material of fine texture deposited in quiet water of lakes or ponds.

Liquid limit — that moisture content (percent moisture by weight on oven-dry basis) at which the soil passes from the plastic to the liquid state.

Lithosol soil — a shallow (<12–15 inches) soil on bedrock, with an A horizon but no B or C.

Loess — a wind deposit composed chiefly of mineral particles of silt size.

Low Humic-Gley soil — a soil with a dark grayish A_1 that grades into a grayish weakly mottled B (a few yellowish-brown to olive spots). Sometimes a weakly developed A_2 is present.

Moraine — a glacial ridge composed of till.

Outwash — water-deposited sediments, usually stratified, primarily from glacial melt waters.

Parent material (soil) — earth material from which soils are formed.

Planosol soil — a soil with a light gray silty to sandy A_2, low in clay, that changes abruptly to a dense, plastic to hard B, high in clay.

Plastic — capable of being molded or smoothed without crumbling.

Plastic limit — that moisture content (percent moisture by weight on oven-dry basis) at which soil material passes from the semisolid to the plastic state, or the lowest moisture content at which soil material can be rolled by hand into a thread ⅛ inch in diameter without crumbling.

Plasticity index — the numerical difference in moisture content between liquid limit and plastic limit.

Prairie — an association of native grass and herb vegetation with no trees or shrubs.

Regosol soil — a shallow soil, with an A horizon but no B horizon, on unweathered, unconsolidated material.

Texture (soil) — the relative proportions of the various particle size fractions — gravel, sand, silt, and clay.

Till (glacial) — mixed materials deposited from glaciers without sorting as to size.

Topography — the pattern of slopes or configuration of a land surface.

Weathering — the disintegration and decomposition of soil materials by action of climatic elements such as air, water, sunlight, freezing, and thawing.

ALPHABETICAL INDEX TO SOIL TYPES

5600—8-63—78880

SOIL REPORTS PUBLISHED

Adams, 24	Henry, 41	Moultrie, 2
Bond, 8	Iroquois, 74**	Ogle, 38
Boone, 65	Jackson, 55*	Peoria, 19
Bureau, 20*	Jasper, 68	Piatt, 47
Calhoun, 53	Johnson, 30	Pike, 11
Cass, 71	Kane, 17	Putnam, 60
Champaign, 18	Kankakee, 13	Randolph, 32
Christian, 73	Kendall, 75	Rock Island, 31
Clay, 1	Knox, 6	Saline, 33
Clinton, 57	Lake, 9	Sangamon, 4
Coles, 44	La Salle, 5	Schuyler, 56
Cumberland, 69	Lawrence, 78	Shelby, 66
DeKalb, 23*	Lee, 37	St. Clair, 63
DeWitt, 67	Livingston, 72**	Stark, 64
Douglas, 43	Logan, 39	Tazewell, 14
Du Page, 16	Macon, 45	Vermilion, 62*
Edgar, 15	Macoupin, 50	Wabash, 61
Edwards, 46	Marion, 34	Warren, 70
Effingham, 48	Marshall, 59	Washington, 58
Fayette, 52	Mason, 28	Wayne, 49
Ford, 54*	McDonough, 7	Whiteside, 40
Fulton, 51	McHenry, 21	Will, 80**
Grundy, 26	McLean, 10	Williamson, 79
Hancock, 27	Menard, 76	Winnebago, 12
Hardin, 3	Mercer, 29	Woodford, 36
Henderson, 77	Morgan, 42	

* No longer available for distribution.
** Report No. 74 for Iroquois county replaces No. 22; No. 72 for Livingston county replaces No. 25; and No. 80 for Will county replaces No. 35.

Much new information about soils has been obtained since the older soil maps and reports in the above list were printed, especially Nos. 1 to 53, which were issued before 1933. For many areas this newer information is necessary if the maps and other soil information in the reports are to be correctly interpreted. Help in making these interpretations can be obtained by writing to the Department of Agronomy, University of Illinois, Urbana.

Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at (800) 457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

Nondiscrimination Statement

Nondiscrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the basis of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, whether all or part of an individual's income is derived from any public assistance program, or protected genetic information. The Department prohibits discrimination in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (http://directives.sc.egov.usda.gov/33081.wba) within 45 days of the date of the alleged discriminatory act, event, or personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form, found online at http://www.ascr.usda.gov/complaint_filing_cust.html or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter by mail to U.S. Department of Agriculture; Director, Office of Adjudication; 1400 Independence Avenue, S.W.; Washington, D.C. 20250-9419; by fax to (202) 690-7442; or by email to program.intake@usda.gov.

Persons with Disabilities

If you are deaf, are hard of hearing, or have speech disabilities and you wish to file either an EEO or program complaint, please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

If you have other disabilities and wish to file a program complaint, please see the contact information above. If you require alternative means of communication for

program information (e.g., Braille, large print, audiotape, etc.), please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

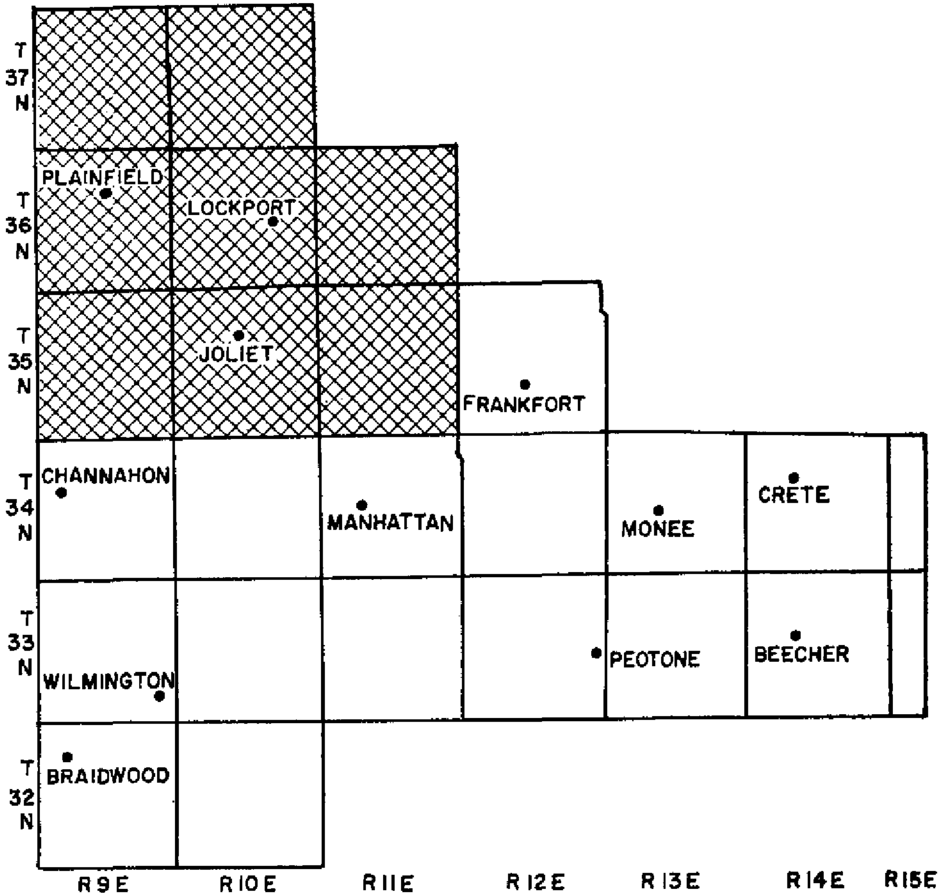
Supplemental Nutrition Assistance Program

For additional information dealing with Supplemental Nutrition Assistance Program (SNAP) issues, call either the USDA SNAP Hotline Number at (800) 221-5689, which is also in Spanish, or the State Information/Hotline Numbers (http://directives.sc.egov.usda.gov/33085.wba).

All Other Inquiries

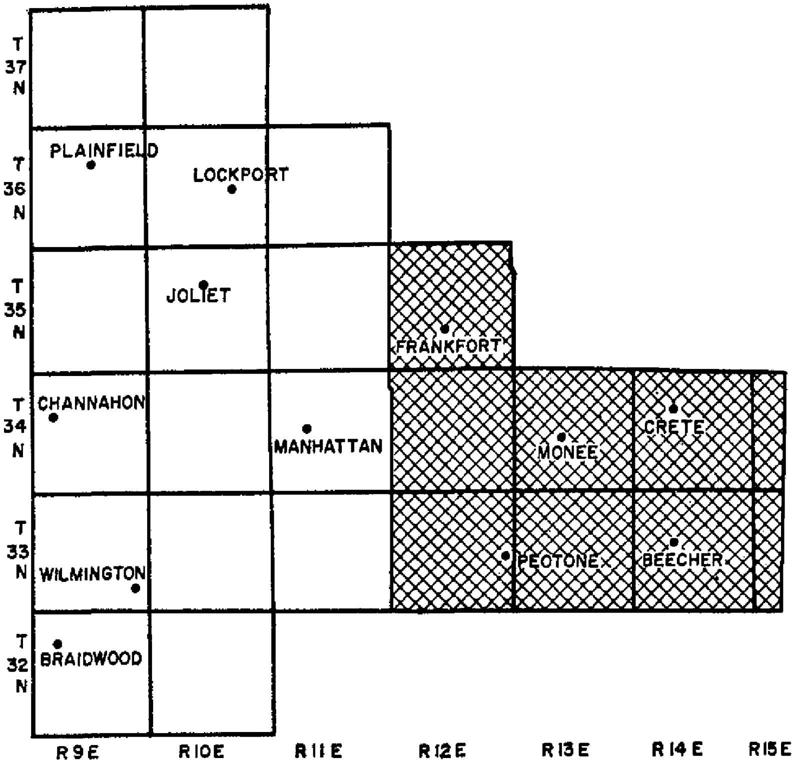
For information not pertaining to civil rights, please refer to the listing of the USDA Agencies and Offices (http://directives.sc.egov.usda.gov/33086.wba).

NORTHWEST SHEET



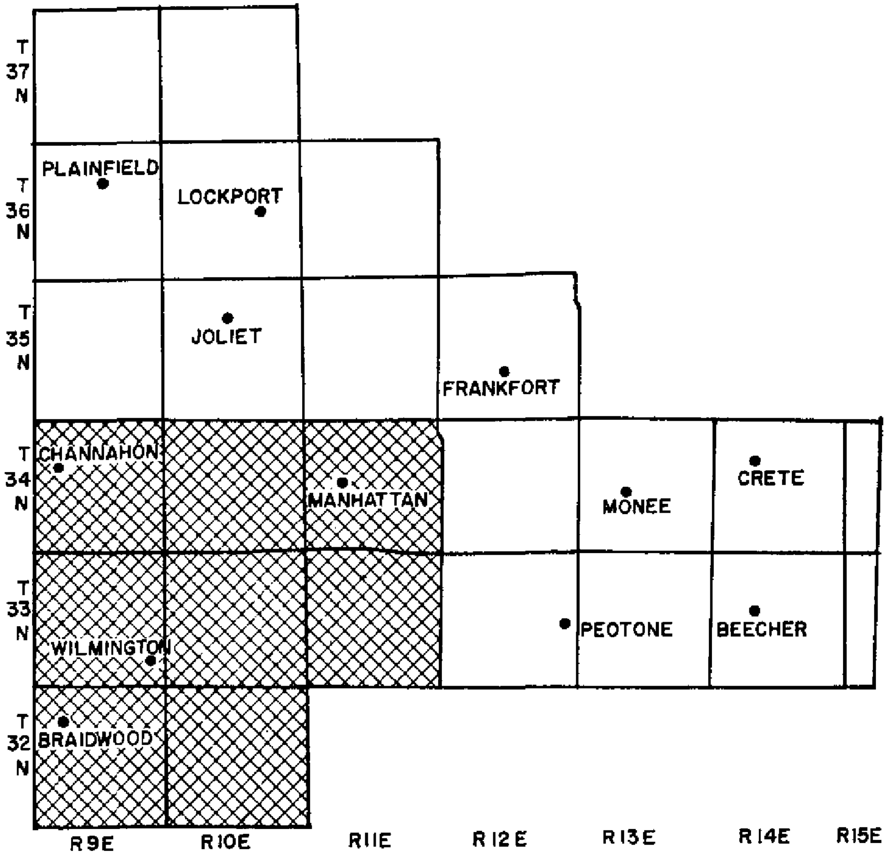
WILL COUNTY SOIL MAP

SOUTHEAST SHEET



WILL COUNTY SOIL MAP

SOUTHWEST SHEET



WILL COUNTY SOIL MAP

NORTHWEST SHEET

SOIL SURVEY MAP OF WILL COUNTY, ILLINOIS

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

in cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

R. T. Odell, in charge of Soil Survey University of Illinois Agricultural Experiment Station
G. D. Smith and W. D. Shrader, Soil Correlators, United States Department of Agriculture

Soils Surveyed by: P. T. Veale, in charge, J. D. Alexander, A. H. Beavers, J. F. Power, B. W. Ray, R. H. Rust, and W. F. Spencer, University of Illinois Agricultural Experiment Station, and H. M. Kuder, Soil Conservation Service

Scale

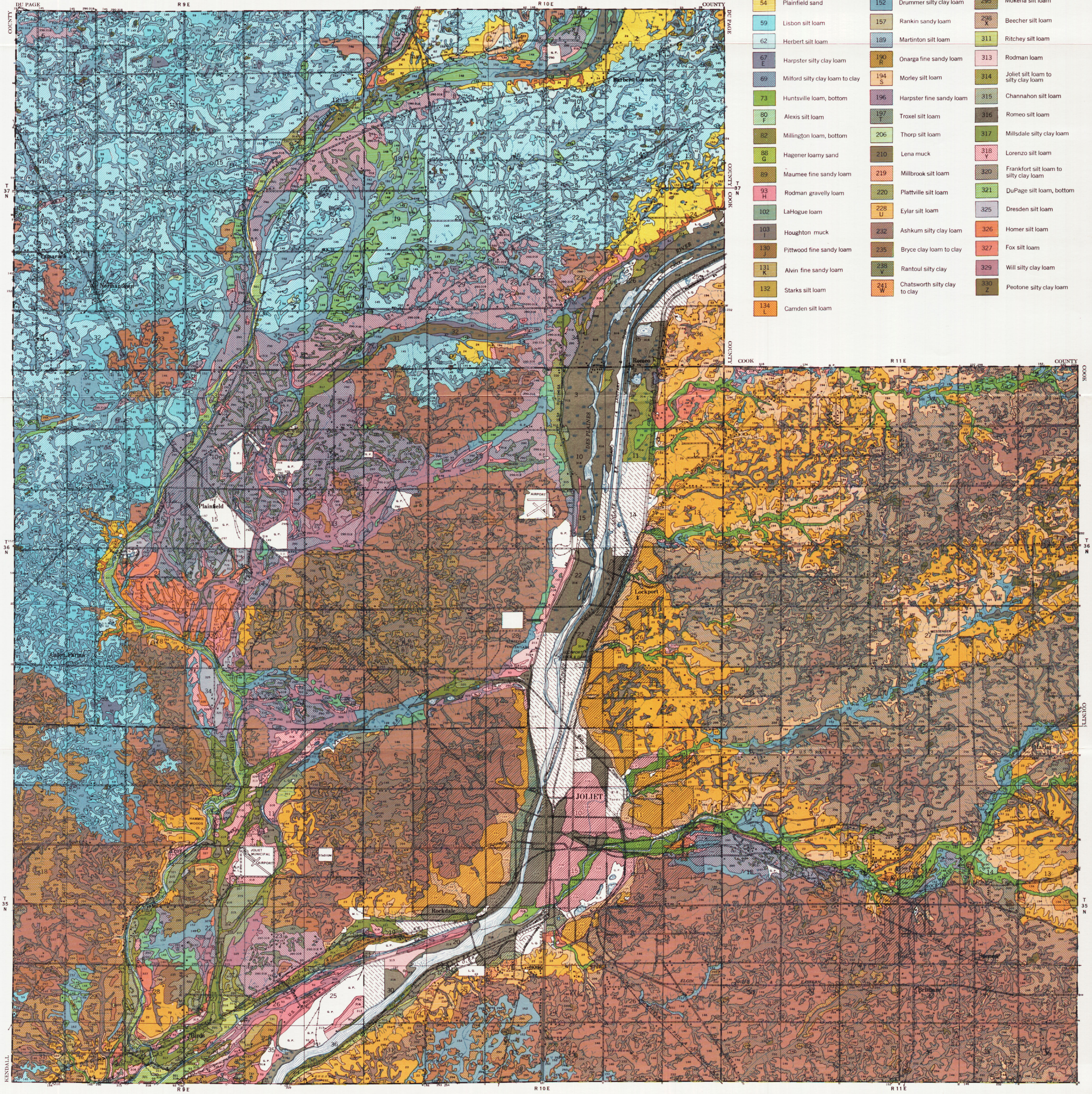
0 1/4 1/2 1 2 miles

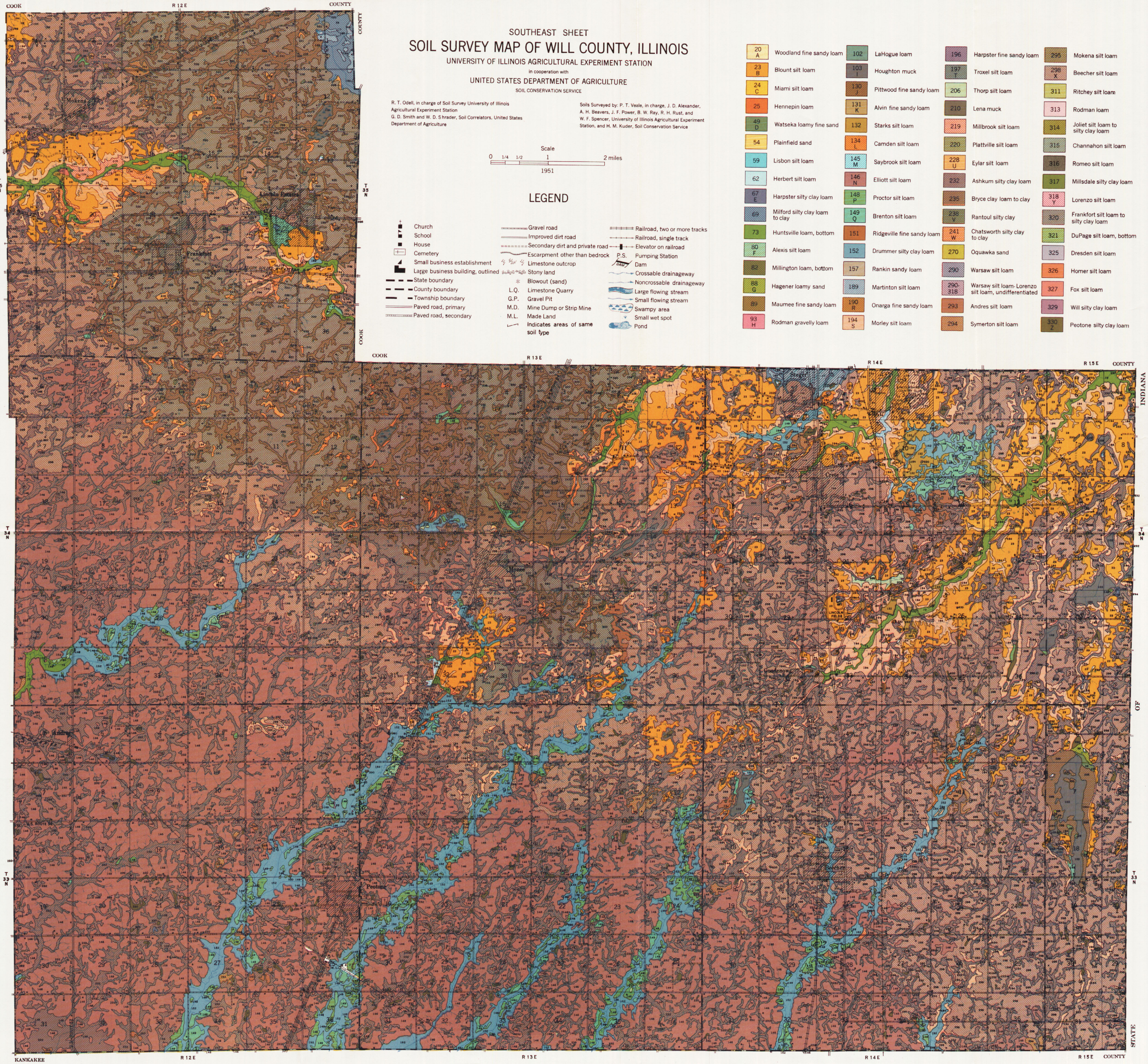
1951

- Church
- School
- House
- Cemetery
- Small business establishment
- Large business building, outlined
- State boundary
- County boundary
- Township boundary
- Paved road, primary
- Paved road, secondary
- Gravel road
- Improved dirt road
- Secondary dirt and private road
- Escarpment other than bedrock
- Limestone outcrop
- Stony land
- Blowout (sand)
- L.Q. Limestone Quarry
- G.P. Gravel Pit
- M.D. Mine Dump or Strip Mine
- M L. Made Land
- Indicates areas of same soil type
- Railroad, two or more tracks
- Railroad, single track
- Elevator on railroad
- P.S. Pumping Station
- Dam
- Crossable drainageway
- Noncrossable drainageway
- Large flowing stream
- Small flowing stream
- Swampy area
- Small wet spot
- Pond

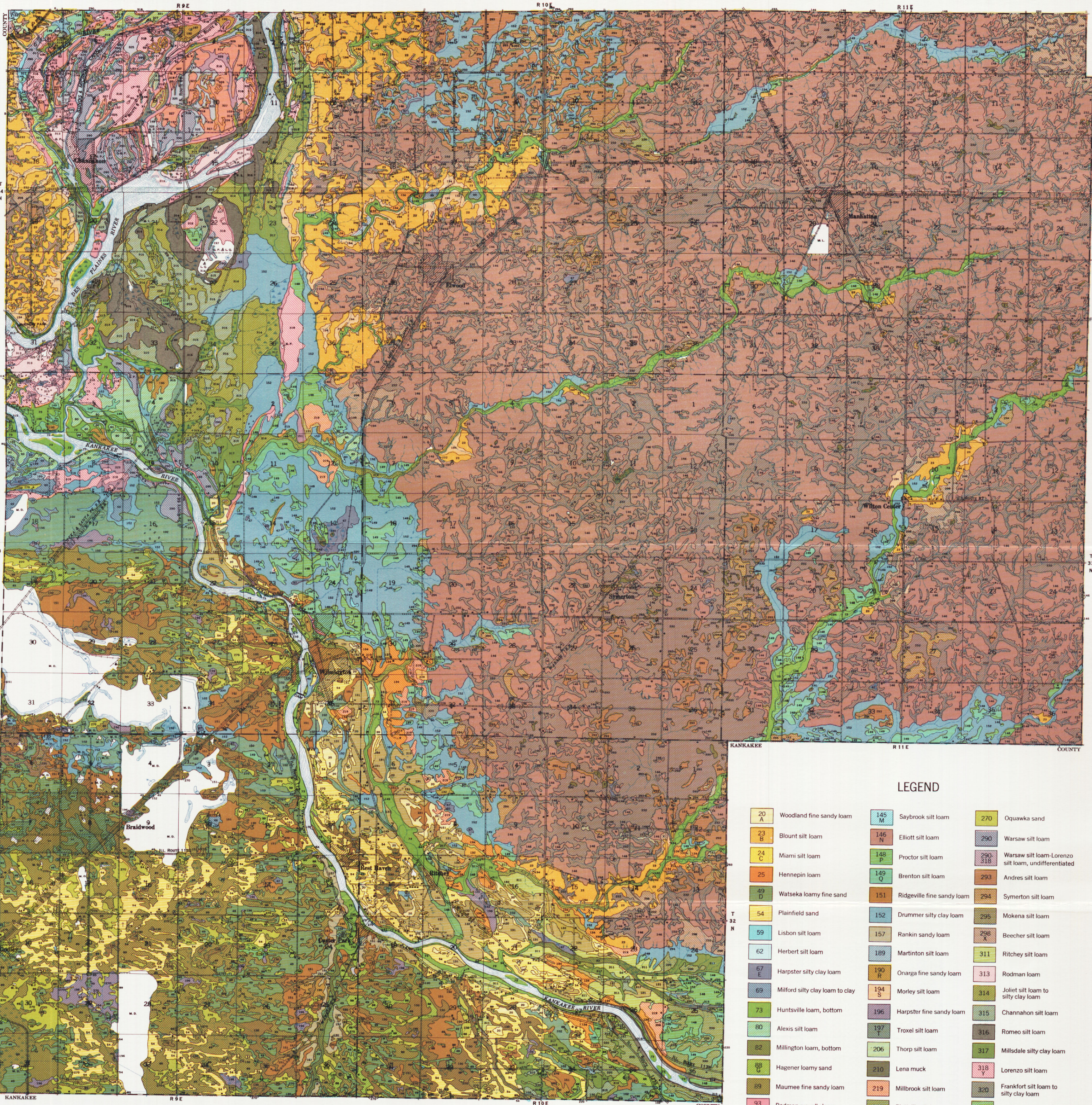
LEGEND

20 A	Woodland fine sandy loam	145 M	Saybrook silt loam	270	Oquawka sand
23 B	Blount silt loam	146 N	Elliott silt loam	290	Warsaw silt loam
24 C	Miami silt loam	148 P	Proctor silt loam	290-318	Warsaw silt loam-Lorenzo silt loam, undifferentiated
25	Hennepin loam	149 Q	Brenton silt loam	293	Andres silt loam
49 D	Watseka loamy fine sand	151	Ridgeville fine sandy loam	294	Symerton silt loam
54	Plainfield sand	152	Drummer silty clay loam	295	Mokena silt loam
59	Lisbon silt loam	157	Rankin sandy loam	298 X	Beecher silt loam
62	Herbert silt loam	189	Martinton silt loam	311	Ritchey silt loam
67 E	Harpster silty clay loam	190 R	Onarga fine sandy loam	313	Rodman loam
69	Milford silty clay loam to clay	194 S	Morley silt loam	314	Joliet silt loam to silty clay loam
73	Huntsville loam, bottom	196	Harpster fine sandy loam	315	Channahon silt loam
80 F	Alexis silt loam	197 T	Troxel silt loam	316	Romeo silt loam
82	Millington loam, bottom	206	Thorp silt loam	317	Millsdale silty clay loam
88 G	Hagener loamy sand	210	Lena muck	318 Y	Lorenzo silt loam
89	Maumee fine sandy loam	219	Millbrook silt loam	320	Frankfort silt loam to silty clay loam
93 H	Rodman gravelly loam	220	Plattville silt loam	321	DuPage silt loam, bottom
102	LaHogue loam	228 U	Eylar silt loam	325	Dresden silt loam
103 I	Houghton muck	232	Ashkum silty clay loam	326	Homer silt loam
130 J	Pittwood fine sandy loam	235	Bryce clay loam to clay	327	Fox silt loam
131 K	Alvin fine sandy loam	238 V	Rantoul silty clay	329	Will silty clay loam
132	Starks silt loam	241 W	Chatsworth silty clay to clay	330 Z	Peotone silty clay loam
134 L	Camden silt loam				





SOUTHEAST SHEET
SOIL SURVEY MAP OF WILL COUNTY, ILLINOIS
UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION
in cooperation with
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
R. T. Odell, in charge of Soil Survey University of Illinois Agricultural Experiment Station
G. D. Smith and W. D. Shrader, Soil Correlators, United States Department of Agriculture
Soils Surveyed by: P. T. Veale, in charge, J. D. Alexander, A. H. Beavers, J. F. Power, B. W. Ray, R. H. Rust, and W. F. Spencer, University of Illinois Agricultural Experiment Station, and H. M. Kuder, Soil Conservation Service
Scale
0 1/4 1/2 1 2 miles
1951
LEGEND
Church
School
House
Cemetery
Small business establishment
Large business building, outlined
State boundary
County boundary
Township boundary
Paved road, primary
Paved road, secondary
Gravel road
Improved dirt road
Secondary dirt and private road
Escarpment other than bedrock
Limestone outcrop
Stony land
Blowout (sand)
L.Q. Limestone Quarry
G.P. Gravel Pit
M.D. Mine Dump or Strip Mine
M.L. Made Land
Indicates areas of same soil type
Railroad, two or more tracks
Railroad, single track
Elevator on railroad
P.S. Pumping Station
Dam
Crossable drainageway
Noncrossable drainageway
Large flowing stream
Small flowing stream
Swampy area
Small wet spot
Pond
20 A Woodland fine sandy loam
23 B Blount silt loam
24 C Miami silt loam
25 Hennepin loam
49 D Watseka loamy fine sand
54 Plainfield sand
59 Lisbon silt loam
62 Herbert silt loam
67 E Harpster silty clay loam
69 Milford silty clay loam to clay
73 Huntsville loam, bottom
80 F Alexis silt loam
82 Millington loam, bottom
88 G Hagener loamy sand
89 Maumee fine sandy loam
93 H Rodman gravelly loam
102 LaHogue loam
103 I Houghton muck
130 J Pittwood fine sandy loam
131 K Alvin fine sandy loam
132 Starks silt loam
134 L Camden silt loam
145 M Saybrook silt loam
146 N Elliott silt loam
148 P Proctor silt loam
149 Q Brenton silt loam
151 Ridgeville fine sandy loam
152 Drummer silty clay loam
157 Rankin sandy loam
189 Martinton silt loam
190 R Onarga fine sandy loam
194 S Morley silt loam
196 Harpster fine sandy loam
197 T Troxel silt loam
206 Thorp silt loam
210 Lena muck
219 Millbrook silt loam
220 Plattville silt loam
228 U Eylar silt loam
232 Ashkum silty clay loam
235 Bryce clay loam to clay
238 V Rantoul silty clay
241 W Chatsworth silty clay to clay
270 Oquawka sand
290 Warsaw silt loam
290-318 Warsaw silt loam-Lorenzo silt loam, undifferentiated
293 Andres silt loam
294 Symerton silt loam
295 Mokena silt loam
298 X Beecher silt loam
311 Ritchey silt loam
313 Rodman loam
314 Joliet silt loam to silty clay loam
315 Channahon silt loam
316 Romeo silt loam
317 Millsdale silty clay loam
318 Y Lorenzo silt loam
320 Frankfort silt loam to silty clay loam
321 DuPage silt loam, bottom
325 Dresden silt loam
326 Homer silt loam
327 Fox silt loam
329 Will silty clay loam
330 Z Peotone silty clay loam
COOK
R 12 E
COUNTY
T 35 N
R 13 E
R 14 E
R 15 E
INDIANA
T 34 N
T 33 N
STATE OF
KANKAKEE



LEGEND

20 A	Woodland fine sandy loam	145 M	Saybrook silt loam	270	Oquawka sand
23 B	Blount silt loam	146 N	Elliott silt loam	290	Warsaw silt loam
24 C	Miami silt loam	148 P	Proctor silt loam	290-318	Warsaw silt loam-Lorenzo silt loam, undifferentiated
25	Hennepin loam	149 Q	Brenton silt loam	293	Andres silt loam
49 D	Watseka loamy fine sand	151	Ridgeville fine sandy loam	294	Symerton silt loam
54	Plainfield sand	152	Drummer silty clay loam	295	Mokena silt loam
59	Lisbon silt loam	157	Rankin sandy loam	298 X	Beecher silt loam
62	Herbert silt loam	189	Martinton silt loam	311	Ritchey silt loam
67 E	Harpster silty clay loam	190 R	Onarga fine sandy loam	313	Rodman loam
69	Milford silty clay loam to clay	194 S	Morley silt loam	314	Joliet silt loam to silty clay loam
73	Huntsville loam, bottom	196	Harpster fine sandy loam	315	Channahon silt loam
80	Alexis silt loam	197 T	Troxel silt loam	316	Romeo silt loam
82	Millington loam, bottom	206	Thorp silt loam	317	Millsdale silty clay loam
88 G	Hagener loamy sand	210	Lena muck	318 Y	Lorenzo silt loam
89	Maumee fine sandy loam	219	Millbrook silt loam	320	Frankfort silt loam to silty clay loam
93 H	Rodman gravelly loam	220	Plattville silt loam	321	DuPage silt loam, bottom
102	LaHogue loam	228 U	Eylar silt loam	325	Dresden silt loam
103 I	Houghton muck	232	Ashkum silty clay loam	326	Homer silt loam
130 J	Pittwood fine sandy loam	235	Bryce clay loam to clay	327	Fox silt loam
131 K	Alvin fine sandy loam	238 V	Rantoul silty clay	329	Will silty clay loam
132	Starks silt loam	241 W	Chatsworth silty clay to clay	330 Z	Peotone silty clay loam
134 L	Camden silt loam				

Church
School
House
Cemetery
Small business establishment
Large business building, outlined
State boundary
County boundary
Township boundary
Paved road, primary
Paved road, secondary

Gravel road
Improved dirt road
Secondary dirt and private road
Escarpment other than bedrock
Limestone outcrop
Stony land
Blowout (sand)
L.Q. Limestone Quarry
G.P. Gravel Pit
M.D. Mine Dump or Strip Mine
M.L. Made Land
Indicates areas of same soil type

Railroad, two or more tracks
Railroad, single track
Elevator on railroad
P.S. Pumping Station
DAM Dam
Crossable drainageway
Noncrossable drainageway
Large flowing stream
Small flowing stream
Swampy area
Small wet spot
Pond or Lake

Scale

0 1/4 1/2 1 2 miles

1951

R. T. Odell, in charge of Soil Survey University of Illinois Agricultural Experiment Station
G. D. Smith and W. D. Shrader, Soil Correlators, United States Department of Agriculture

Soils Surveyed by: P. T. Veale, in charge, J. D. Alexander, A. H. Beavers, J. F. Power, B. W. Ray, R. H. Rust, and W. F. Spencer, University of Illinois Agricultural Experiment Station, and H. M. Koder, Soil Conservation Service

SOIL SURVEY MAP OF WILL COUNTY, ILLINOIS

UNIVERSITY OF ILLINOIS AGRICULTURAL EXPERIMENT STATION

in cooperation with

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

SOUTHWEST SHEET